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FINAL

FIRST SEMIANNUAL PERFORMANCE MONITORING REPORT
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ENHANCED IN SITU BIOREMEDIATION OF CHLORINATED VOLATILE ORGANIC COMPOUNDS
INSTALLATION RESTORATION PROGRAM SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

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EXECUTIVE SUMMARY

This report describes the installation and operation of a remediation system and the associated performance monitoring for groundwater contaminated with chlorinated volatile organic compounds (CVOCs) at Installation Restoration Program (IRP) Site 40 (Concrete Pit/Gravel Area), located at Naval Weapons Station (NAVWPNSTA) Seal Beach, Seal Beach, California. Tetra Tech EC, Inc. (TtEC) prepared this document for Naval Facilities Engineering Command, Southwest (NAVFAC SW) under Contract Task Order 0090 of the Remedial Action Contract (RAC) Program, Contract No. N68711-98-D-5713. The Department of the Navy (DON) directs this remedial action in accordance with requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The DON determined that this site contains elevated concentrations of CVOCs, including tetrachloroethene (PCE) and trichloroethene (TCE) in groundwater, and thus requires a response action. The decision regarding the response action is documented in the Record of Decision (ROD) (DON, 2004).

The DON has documented the occurrence of natural biodegradation processes, which contribute to natural attenuation of CVOCs. Groundwater modeling has shown that the plume is relatively slow moving and is expected to attenuate naturally over time, which will eventually reduce CVOC impacts at IRP Site 40. However, the DON has begun a remedial action for IRP Site 40 in order to enhance the natural processes, and thereby accelerate the cleanup timeframe.

Among the CVOCs, PCE and TCE were identified as the primary chemicals of concern (COCs) for IRP Site 40 groundwater. However, since the biological degradation of PCE and TCE will result in the formation of 1,2-dichloroethene (1,2-DCE) and vinyl chloride (VC), these chemicals are also considered to be COCs. The target cleanup levels for IRP Site 40 groundwater are as follows:

Analyte	Concentration (μg/L)
cis-1,2-dichloroethene	6
trans-1,2-dichloroethene	10
Trichloroethene	5
Tetrachloroethene	5
Vinyl chloride	0.5

The selected remedy for groundwater at IRP Site 40 is enhanced in situ bioremediation (EISB), monitored natural attenuation (MNA), and land-use controls (LUCs). This report covers the first 6 months of implementing the EISB portion of the remedy. Based on the results of a pilot study, EISB is being applied at this site by: 1) injecting sodium lactate into groundwater to generate conditions favorable for reductive dechlorination and to stimulate growth of indigenous microorganisms capable of degrading PCE and TCE to DCE; and 2) bioaugmenting the groundwater with a commercially available dechlorinating microbial culture containing *Dehalococcoides* spp. (DHC) to complete reductive dechlorination of DCE to innocuous end products. Prior to bioaugmentation, an attempt was made to recirculate groundwater from a well that had been bioaugmented during the pilot study to other injection wells in order to increase distribution of dechlorinating microorganisms.

To implement the EISB system, 18 injection wells, eight groundwater monitoring wells, and four vapor monitoring wells were installed in the area of contamination. The design radius of influence of the injection well array was 25 feet in the downgradient direction and 20 feet in the cross-gradient direction. The lactate injection and groundwater recirculation system consisted of a product dispenser, which mixed a concentrate of sodium lactate solution and potable water to the desired proportion of 3 percent by volume. The product dispenser was connected with flexible hose to a potable water source, 260-gallon capacity totes of 60 percent sodium lactate solution, associated filters and valves, and packers in the injection wells.

Well installation and development began on February 23, 2005, and was completed on March 16, 2005. Injection of sodium lactate in the injection wells began on March 28, 2005, and was conducted according to a schedule in which sets of five or six wells were injected at a frequency of 2 days per week with the 3 percent lactate solution, for a 9-week period (Round 1). Round 1 injection was conducted from March 28, 2005, to May 27, 2005. During Round 1, lactate solution was injected at flow rates ranging from 0.9 to 4.6 gallons per minute (gpm) per well, resulting in a total injection volume of approximately 472,000 gallons. After completion of the Round 1 injection, groundwater recirculation was conducted in an attempt to distribute DHC from injection well IW-05 (formerly MW-40-27, which had previously undergone bioaugmentation during the pilot study) to the other injection wells. A total of approximately 18,000 gallons of DHC-laden groundwater was pumped into 16 injection wells from IW-5. Following Round 1 and groundwater recirculation, the Round 2 lactate injection was conducted from August 1, 2005, to October 11, 2005, (according to a schedule similar to that used in Round 1 and at a frequency of 1 day per week) and resulted in a total injection volume of approximately 217,000 gallons.

Baseline monitoring was conducted prior to injection, and biweekly (field parameters) and monthly (field and laboratory parameters) performance monitoring was conducted since the first round of lactate injection. The field measurements included nitrate, sulfate, ferrous iron, carbon dioxide, alkalinity, chemical oxygen demand (COD), pH, temperature, conductivity, oxidation/reduction potential (ORP) and dissolved oxygen (DO); and the laboratory measurement included volatile organic compounds (VOCs), general geochemistry, hydrogen sulfide, dissolved hydrogen, COD, and microbiological parameters. In addition, groundwater level measurements, soil vapor/gas monitoring, and surface methane gas emissions monitoring were conducted at a minimum of once a month. Performance monitoring thus far has yielded the following major observations:

- Several monitoring wells appear to show evidence of degradation of PCE and TCE, but not of DCE. Wells following this general pattern include MW-40-30, -31, -32, and -37. In addition, MW-40-14 and MW-40-35 show evidence of PCE and TCE degradation, and potential degradation of DCE as well. Overall, the CVOC data generally suggest that substrate is present at these well locations, and that to some degree, microbial activity is occurring and promoting reductive dechlorination of PCE and TCE.
- The general extents of PCE and TCE impacts have decreased minimally, the extent of DCE has increased, and VC production is minimal. This is in line with the overall assessment that reductive dechlorination of PCE and TCE appears evident, but that further degradation to VC and ethene has not occurred to a significant extent.
- COD concentrations have generally shown increasing trends to varying degrees in the monitoring wells, which provides evidence of lactate migration, and generally confirms the 25-foot radius of influence that was used in well field design at several monitoring well locations.
- Significant concentrations of volatile fatty acids (VFAs) were detected in wells where COD was present at the highest concentrations (MW-14, -31, -32, -34, and -35). In these cases, all VFAs were present, providing evidence of lactate degradation by native bacteria, as expected.
- DO and nitrate (NO_3^-) were present at very low concentrations at all monitoring locations during the baseline event and all subsequent events, providing preliminary evidence that groundwater beneath the site is anoxic.
- Data provide evidence of sulfate reduction, to varying degrees, in many of the monitoring wells located in the central area of the plume (MW-40-14, -30, -31, -32, -33, -34 -35). This is indicative of optimal conditions for reductive dechlorination.
- Carbon dioxide (CO_2) concentrations have increased in most of the monitoring wells (except MW-40-02) to varying degrees, providing evidence of general biological activity. In addition, increases in the levels of methane, and in some cases hydrogen sulfide, are apparent in all wells, except MW-40-02, -33 -38, and -39. This provides further evidence that the system is substantially reduced in key areas of the plume.
- Alkalinity increased in MW-40-14, -31, -32, -34, and -35, which is a result of CO_2 generation, and a general indicator of biological activity.
- DHC was not detected during the pilot test (prior to bioaugmentation) and was believed not to occur naturally at this site. However, DHC has been consistently detected at relatively low levels at most monitoring locations during the full-scale project, including during the baseline event. In areas near the pilot test

injection/monitoring wells, these detections may be due to the DHC strain that was injected during the test. However, DHC deoxyribonucleic acid (DNA) was also detected in wells located at considerable distances from the pilot test area, including in MW-40-02 and -38, which are located approximately 100 and 220 feet (respectively) in the cross-gradient direction and -39, which is located approximately 400 feet downgradient. Since it is unlikely that the bioaugmented DHC strain from the pilot study has migrated to these locations, it is likely that there may be low levels of DNA associated with a native DHC strain that were not detected during the pilot study. Nevertheless, DHC concentrations have generally not increased substantially at most monitoring locations during the 6 months of system operation. In few instances, however, (notably MW-40-14, -31, and -32), increasing concentrations of DHC may correlate with increased COC degradation, as evidenced by elevated VC and ethene concentrations. Nevertheless, on a site-wide basis, accumulation of DCE is generally significant, as it was in the pilot test prior to bioaugmentation. Thus, it may generally be assumed at this time that the DHC strain that has been detected in areas other than the original pilot test area are likely incompetent (slow growing and/or possessing limited capacity for reductive dechlorination) or are present at levels too low to rapidly impact the concentrations of chlorinated ethenes.

Perhaps it should also be noted that qualitative polymerase chain reaction (qPCR) analyses were conducted during the pilot test at the University of California and at Idaho State University. For the full-scale project, the analyses were conducted at Microbial Insights (affiliated with the Center for Biomarker Analysis, University of Tennessee, Knoxville), which uses DHC primers developed in the laboratory of Frank Loffler of the Georgia Institute of Technology. While each of these facilities are qualified to conduct the analysis, there may be minor differences in techniques used in the analyses and detection limits, as there are currently no universally accepted practices for qPCR analysis of DHC, and no certifications are available [Microbial Insights regularly conducts quality assurance/quality control (QA/QC) activities in conjunction with Dr. Loffler's academic lab through analyses of interlaboratory control samples]. Microbial Insights reports a detection limit of approximately $5x10^2$ cells (or gene copies) per liter. The pilot test report does not give the limits of detection for the DNA analysis (Table 4-5 in *Final Pilot Test Report for In Situ Enhanced Bioremediation at IR Site 40, Bechtel Environmental Inc.*, November 2004). In our opinion, it is possible that the methods used in the initial study may not have picked up the native strain or that it was present at a level below the limit of detection, as opposed to the possibility that the bioaugmented strain is now essentially dispersed throughout the site to the degree implied by the data. The lack of evidence for significant DCE degradation contributes to the idea that the native strain is "incompetent."

- An attempt to transfer DHC-laden water from MW-40-27 (injection well IW-05) to other injection wells did not appear successful. No appreciable increases to levels near the initial target concentration of 10^5-10^6 DHC cell/liter(L) were noted in the receiving injection wells.

- During the baseline monitoring event (March 2005), PCE was detected in groundwater monitoring well MW-40-07 [48 micrograms per liter (μg/L)]. Since this well is significantly downgradient of the original injection well field, continued monitoring of MW-40-07 is being conducted, and a series of HydroPunch® samples were collected in the vicinity downgradient of MW-40-07. Monitoring results have indicated that CVOC concentrations in MW-40-07 have increased to 110 μg/L, since the baseline measurements. In addition, no CVOCs were detected in the downgradient HydroPunch samples; however, trace amounts of PCE have been detected in MW-40-39 at 0.35J μg/L, which is further downgradient of the HydroPunch sample locations. Injection wells IW-18 and -19 were installed on August 19 and September 10, 2005, respectively. Lactate injections in these two wells commenced immediately following the installation of these wells in order to begin treatment of this area. Finally, PCE was detected during the September monitoring event in well MW-40-17 for the first time. It's not clear whether this is a result of the lactate injections (MW-40-17 is over 150 feet downgradient of the nearest injection well); however, COC concentrations will continue to be monitored in this area, and investigations conducted to address this issue if required.

In summary, the system is generally behaving as expected, based on the pilot test results. Preliminary COC trends show reasonable evidence for reductive dechlorination of PCE and TCE, but DCE appears to be accumulating, and production of VC is not significant. Based on the weight of the evidence, lactate injection has produced geochemical conditions favorable for reductive dechlorination at many locations within the aquifer, which will likely continue to expand to other locations as lactate injection continues. In addition to lactate injection, DHC data suggest that bioaugmentation with KB-1™ culture is required to complete reductive dechlorination at the site.

Based on these observations, the decision was made to proceed with bioaugmentation, as specified in the Work Plan (TtEC, 2005). Site Recovery & Management (SiREM) (sub-consultant to TtEC) performed the bioaugmentation with the KB-1 during the week of September 19. A total of 10 injection wells, including IW-3, -6, -7, -8, -9, -10, -12, -13, -14, and -15 received from 12.5 to 21 liters of the KB-1 culture from September 19 through September 21, 2005. Because of the timing of the bioaugmentation, no performance data are available for this report, and the success of the bioaugmentation will be addressed in subsequent reports.

The following recommendations are made, based on the data evaluation to date:

1) Resume lactate injections following bioaugmentation. This will continue to provide the electron donor required to maintain appropriate conditions for the inoculum and will aid in transport of the organisms radially from the injection points. The rate, frequency, and the duration of sodium lactate injection in the bioaugmented injection wells will be determined based on analysis of the field and laboratory data, including COD, ORP, geochemical, and microbiological measurements.
2) Continue to monitor as specified in the Work Plan, with the following modifications: starting in mid-October 2005, biweekly field testing will revert to monthly. The field testing will be conducted during the middle of the month instead of during the

monthly sampling events for laboratory analysis. This will provide additional information for the period in between the monthly sampling and analysis events, and supplement the laboratory data, which would help in better assessing the data regarding COC behavior and other performance-related parameters.

3) Continue to address downgradient COC migration in the vicinity of MW-40-07 through monitoring, and inject lactate into newly installed injection wells IW-18 and -19, in order to apply treatment to this area. Regularly assess geochemical parameters in MW-40-07, and ORP in IW-18 and IW-19. Upon attaining sulfate-reducing conditions and depending upon COC trends, consider bioaugmentation with KB-1 in this area.

4) In addition, PCE was detected at a concentration of 16 μg/L in MW-40-17 during the September monitoring event. The detection of PCE in MW-40-17 is unexpected and cannot be interpreted as an indication of contiguous expansion of the plume in the easterly direction until further sampling and data analysis can be performed. Therefore, further sampling and analysis of the groundwater in this well will be conducted to assess the conditions in this area.

5) Depending on the success of achieving and maintaining adequate substrate coverage, at some point it may be necessary to look at doing some strategic or focused groundwater recirculation to enhance substrate distribution. This will be evaluated and considered based on the ability to maintain substrate coverage within key plume areas, the degree of success in achieving complete reductive dechlorination in all locations within the plume, and the degree to which the bioaugmented KB-1 culture migrates following bioaugmentation.

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ABBREVIATIONS AND ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
1,2-DCE	1,2-dichloroethene
µg/m^3	micrograms per cubic meter
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
ARAR	applicable or relevant and appropriate requirement
ASTM	American Society for Testing and Materials
BEI	Bechtel Environmental, Inc.
bgs	below ground surface
BNI	Bechtel National, Inc.
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cis-1,2-DCE	cis-1,2-dichloroethene
Cl^-	chloride ion
Cl	chlorine
CO_2	carbon dioxide
COC	chemical of concern
COD	chemical oxygen demand
COPC	chemical of potential concern
CVOC	chlorinated volatile organic compound
DCE	dichloroethene
DHC	*Dehalococcoides ethenogenes* spp.
DNA	deoxyribonucleic acid
DO	dissolved oxygen
DON	Department of the Navy
DPM	Deputy Program Manager
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
EISB	enhanced in situ bioremediation

ABBREVIATIONS AND ACRONYMS
(Continued)

EMAX	EMAS Laboratories, Inc.
EMI	electromagnetic induction
EPA	U.S. Environmental Protection Agency
ERSE	Extended Removal Site Evaluation
EWI	Environmental Work Instruction
FD	field duplicate
Fe(II)	ferrous iron
Fe(III)	ferric iron
FID	flame ionization detector
FS	Feasibility Study
FSI	Focused Site Inspection
GC	gas chromatograph
gpm	gallons per minute
GPR	ground-penetrating radar
H_2	hydrogen
H_2S	hydrogen sulfide
IR	Installation Restoration
IRP	Installation Restoration Program
J	estimated value
JEG	Jacobs Engineering Group, Inc.
L	liter
LEL	lower explosive limit
LUC	land-use control
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
mL	milliliter
mL/min	milliliters per minute
MNA	monitored natural attenuation
Msl	mean sea level
Mn(IV)	manganese (IV)

ABBREVIATIONS AND ACRONYMS
(Continued)

mV	millivolts
NA	not available
NAVD	North American Vertical Datum
NAVFAC SW	Naval Facilities Engineering Command, Southwest
NAVWPNSTA	Naval Weapons Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
nM	nanomoles
NM	not measured
NO_3^-	nitrate
ORP	oxidation/reduction potential
OU	Operable Unit
PCE	tetrachloroethene
PID	photoionization detector
PLFA	phospholipid fatty acid
ppm	parts per million
ppmv	parts per million by volume
psi	pounds per square inch
PVC	polyvinyl chloride
QC	quality control
QED	QED Environmental Systems
Q-PCR	quantitative polymerase chain reaction
RAC	Remedial Action Contract
RAO	remedial action objective
RI	Remedial Investigation
ROD	Record of Decision
ROI	radius of influence
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RWQCB	Regional Water Quality Control Board
SBNWR	Seal Beach National Wildlife Refuge

ABBREVIATIONS AND ACRONYMS
(Continued)

Sch.	Schedule
SCS	Soil Conservation Service
SHSS	Site Health and Safety Specialist
SI	Site Inspection
SiREM	Site Recovery & Management
SO_4^{2-}	sulfate
SRB	sulfate-reducing bacteria
SVOC	semivolatile organic compound
SWRCB	State Water Resource Control Board
TCE	trichloroethene
TCG	target cleanup goal
TDS	total dissolved solids
TO	Toxic Organics
toc	top of casing
TOC	total organic carbon
trans-1,2-DCE	trans-1,2-dichloroethene
TSDF	treatment, storage, and disposal facility
TtEC	Tetra Tech EC, Inc.
U	not detected at or below the reporting limit
USCS	Unified Soil Classification System
VC	vinyl chloride
VFA	volatile fatty acid
VOA	volatile organic analysis
VOC	volatile organic compound
WB	California Water Board
WBZ	water-bearing zone

1.0 INTRODUCTION

This report represents the first semiannual report summarizing the operational status of the remedial action for groundwater contaminated with chlorinated solvents at Installation Restoration Program (IRP) Site 40 (Concrete Pit and Gravel Area), located at Naval Weapons Station (NAVWPNSTA) Seal Beach, Seal Beach, California (Figures 1-1, 1-2, and 1-3). Tetra Tech EC, Inc. (TtEC) prepared this document for Naval Facilities Engineering Command, Southwest (NAVFAC SW) under Contract Task Order 0090 of the Remedial Action Contract (RAC) Program, Contract No. N68711-98-D-5713.

The Department of the Navy (DON), NAVFAC SW, directs this remedial action in accordance with requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The DON has determined upon review of the site's operational history and site-specific groundwater investigative data that this site contains elevated concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) in groundwater, thus requiring a response action. This decision is documented in the Record of Decision (ROD) (DON, 2004). The DON has initiated the remedial action for the impacted groundwater at IRP Site 40 to reduce any potential threats to human health and the surrounding environment. The remedial action for the impacted groundwater at IRP Site 40 is enhanced in situ bioremediation (EISB) and performance monitoring, monitored natural attenuation (MNA), and land-use controls (LUCs).

1.1 PURPOSE AND SCOPE

The purpose of this report is to summarize the initial 6 months of the remedial action for treatment of groundwater contaminated with chlorinated solvents at IRP Site 40. This report includes background information regarding the site, initial remedy selection and testing that was conducted, a review of the technical approach and methods that were employed, presentation and evaluation of results, and conclusions and recommendations. The report includes data collected from March through September 2005. As the project is in its early stage, this report focuses on the EISB. While MNA is part of the remedy, it is only briefly addressed herein and will be evaluated in greater detail in subsequent reports following completion (or near completion) of the EISB phase.

1.2 REGULATORY OVERVIEW

Groundwater remediation at IRP Site 40 is being conducted as part of the IRP. The program identifies, assesses, characterizes, and cleans up or controls pollutants from past hazardous waste disposal operations and spills. The program was established to comply with federal requirements regarding cleanup of hazardous waste sites. These federal requirements are outlined in CERCLA, as amended by the Superfund Amendments and Reauthorization Act. The DON, under the

Defense Environmental Restoration Program, follows the U.S. Environmental Protection Agency (EPA) protocols.

The primary objective of the remedial action is to protect human health and the environment. Accordingly, remedial action objectives (RAOs) and target cleanup goals (TCGs) were developed to provide objectives used to define and evaluate remedial action alternatives. Potential applicable or relevant and appropriate requirements (ARARs) were initially identified and evaluated to assist in determining RAOs and recommended TCGs. ARARs were discussed in detail in the Work Plan (TtEC, 2005). RAOs and recommend TCGs are summarized in the following subsections.

1.2.1 Remedial Action Objectives

The following RAOs were developed for IRP Site 40 groundwater cleanup (DON, 2004):

- Consistent with EPA; State Water Resources Control Board (SWRCB), California Environmental Protection Agency (Cal/EPA); and California Water Board (WB), Santa Ana Region, policies and regulations protect existing beneficial uses of the shallow aquifer underlying NAVWPNSTA Seal Beach to the extent practical while preventing or minimizing volatile organic compound (VOC) migration beyond the current NAVWPNSTA Seal Beach boundaries at concentrations exceeding site remediation goals
- Protect human health by preventing extraction of VOC-impacted shallow groundwater for domestic use until site remediation goals are achieved

1.2.2 Target Cleanup Goals

Two chlorinated VOCs (CVOCs), PCE and TCE, are the primary chemicals of concern (COCs) for IRP Site 40 groundwater. However, since the biological degradation of PCE and TCE will result in the formation of 1,2-dichloroethene (1,2-DCE) and vinyl chloride (VC), these chemicals are also considered to be COCs.

The TCGs for IRP Site 40 groundwater were developed based on an analysis of ARARs (DON, 2004) and are listed in Table 1-1. These groundwater remediation goals support the RAO of restoring the shallow aquifer underlying NAVWPNSTA Seal Beach as a potential drinking water supply to the extent practical. The values listed in the table are federal Maximum Contaminant Levels (MCLs) for drinking water promulgated by EPA or California MCLs established by the Department of Health Services, whichever is lower for a given constituent (DON, 2004).

The attainment area for this remedial action is defined as the footprint of the PCE concentrations exceeding the MCL of 5 micrograms per liter (µg/L) at IRP Site 40. The DON does not intend to establish a point of compliance for this remedial action (DON, 2004).

2.0 BACKGROUND INFORMATION

Information on facility and site description, previous investigations, pertinent site details and conditions, are presented in this section.

2.1 FACILITY AND SITE DESCRIPTION

Facility and site descriptions are presented in this section.

2.1.1 NAVWPNSTA Seal Beach

NAVWPNSTA Seal Beach is located about 30 miles south of the Los Angeles urban center. NAVWPNSTA Seal Beach consists of approximately 5,000 acres of land along the Pacific Coast within the city of Seal Beach in Orange County, California (Figure 1-1). NAVWPNSTA Seal Beach is bordered on the southwest by Anaheim Bay, on the north by Interstate 405 (San Diego Freeway), on the east by Bolsa Chica Road, on the west by Seal Beach Boulevard, and on the southeast by a flood control channel. Originally commissioned in 1944, NAVWPNSTA Seal Beach is part of the Navy Region Southwest. NAVWPNSTA Seal Beach provides fleet combatants with ready-for-use ordnance. Because of its geographic location, the NAVWPNSTA serves as a supply point for the operating forces of the DON and United States Marine Corps forces in the southern California region. Figure 1-2 shows a map of NAVWPNSTA Seal Beach, including the location of IRP Site 40.

2.1.2 IRP Site 40 Site

IRP Site 40 (Figure 1-3) includes a concrete pit located in the Locomotive Shop (Building 240) and a gravel area located north of, and adjacent to, the building. The concrete pit formerly provided a collection point for oil and solvents spilled during locomotive maintenance activities. Until 1978, oil that collected in the pit discharged into the gravel area through a drainpipe. The pipe was plugged in 1978. Currently, the area north of Building 240 is paved and the area northwest of Building 240 is unpaved. Four railroad spurs terminate in Building 240 and provide locomotive access to the repair shop.

2.2 SUMMARY OF PREVIOUS STUDIES AND INVESTIGATIONS

A number of studies and investigations have been conducted at NAVWPNSTA Seal Beach. These previous investigations are listed in the Work Plan (TtEC, 2005) and information relevant to IRP Site 40 is summarized in the remainder of this section.

2.2.1 Remedial Investigations

In 1995, Jacobs Engineering Group, Inc. (JEG) conducted a Site Inspection (SI) of 16 Operable Unit (OU) 4 sites, including IRP Site 40 (JEG, 1995). The SI found that two chemicals of potential concern (COPCs), carbon tetrachloride and PCE, had been released to the groundwater at this site. The SI report also recommended a Focused Site Inspection (FSI) to evaluate the nature and extent of chlorinated hydrocarbons in the groundwater. An FSI was conducted at IRP Site 40 in conjunction with further investigations at seven additional sites in OUs 4 and 5 (JEG, 1996). The FSI concluded that a plume of chlorinated hydrocarbons containing PCE, TCE, and 1,2-DCE was present in groundwater beneath IRP Site 40. The study delineated the lateral extent of the plume in the shallow water-bearing zone (WBZ) as approximately 270 feet by 200 feet. Because PCE, TCE, and 1,2-DCE were detected at levels exceeding state and federal MCLs, further action was recommended.

In 1998, an Extended Removal Site Evaluation (ERSE) was conducted to supplement data from previous investigations at IRP Site 40 [Bechtel National Inc. (BNI), 1999]. The ERSE included soil and groundwater sampling, and the findings enabled the DON to support a decision for a no further action, removal action, or further evaluation. Although no immediate threat to human health or the environment from groundwater was indicated, the ERSE Report recommended a response action to address groundwater at IRP Site 40 because cumulative human health risk exceeded the generally acceptable range as defined in the NCP. The DON determined that the ERSE for IRP Site 40 substantially complied with the requirements of a Remedial Investigation (RI) under CERCLA and that it was appropriate to proceed directly to a Feasibility Study (FS).

2.2.2 Feasibility Study

An FS Report for groundwater cleanup at IRP Site 40 (Concrete Pit/Gravel Area) was developed [Bechtel Environmental, Inc. (BEI), 2000]. The FS Report did not identify or recommend a preferred remedial alternative for IRP Site 40. The FS evaluated EISB for IRP Site 40. The technology offers the possibility of significantly accelerating the overall cleanup time frame. A consideration is that intermediate by-products can be formed that may be more toxic and hazardous than the primary COCs. The technology must, therefore, be implemented in a manner that completes the anaerobic biodegradation of the VOCs to harmless by-products. Because limited data existed on the technology, bench-scale and pilot-scale testing was recommended in the FS Report (BEI, 2000).

2.2.3 Bench-scale Testing

A bench-scale test was performed from May to October 2000. Groundwater samples and soil samples from the saturated zone were collected from IRP Site 40 in April 2000. Four aqueous bioreactors inoculated with small amounts of soil [100 grams of soil and 800 milliliters (mL) of groundwater] were then formulated in the laboratory and actively monitored for 5 months during the bench-scale test.

The results of the bench-scale test were used to help predict what microbiological activities and chemical and physical conditions might be observed in the field. Dechlorination was not reported during the bench-scale test. The overall goal of the laboratory test was to verify the existence of a complete anaerobic degradation pathway with a reaction rate that would enhance the remediation time frame. The study showed that indigenous microbes capable of lactate fermentation and sulfate reduction were present in the samples obtained from IRP Site 40. The presence of dechlorination daughter products [cis-1,2-dichloroethene (cis-1,2-DCE) and TCE] provided strong evidence that microorganisms capable of reductive dechlorination were present at the site, although they were not apparent in the bench-scale test (BEI, 2004).

2.2.4 Pilot Test

Based on the results of the bench-scale test, a pilot-scale test was designed and implemented by the DON in order to generate the critical performance and cost data necessary for remedy evaluation and selection, and to verify that the process could meet the site's cleanup criteria (BEI, 2004). Specifically, the goal of the pilot-scale test was to verify the effectiveness of EISB on PCE and its natural degradation products [TCE, dichloroethene (DCE), VC, and ethene] at IRP Site 40.

The pilot-scale test was conducted in two phases. Phase I (conducted from July 2001, to April 2002) involved biostimulation of indigenous bacteria with sodium lactate. During Phase II (conducted from March to December 2003), bioaugmentation was conducted using bacteria that were not indigenous to the site.

Reductive dechlorination was confirmed during Phase I, but the reaction process was incomplete. PCE was reduced to DCE, but DCE was not reduced further to VC or ethene. It was reasoned that an appropriate microbial consortium for complete reductive dechlorination was not present at the site. Bacterial characterization tests indicated that the specific bacteria strain known to be capable of complete dechlorination from PCE to ethene was not present at IRP Site 40.

Phase II involved adding a bacteria culture that has been shown to completely dechlorinate PCE to ethene in other aquifers. Additional sodium lactate injections were performed over a 5-month period. In the second month, a commercially available bacterial culture capable of carrying out complete reductive dechlorination was added to two bioaugmentation wells. Effects were monitored over an 8-month period using groundwater and soil gas wells. Results indicated that the introduced bacteria were able to overcome the limitation on dechlorination. Based on the results of the pilot-scale test, the DON believed that sufficient information was generated to select EISB, followed by MNA, as the preferred remedial alternative for IRP Site 40 (BEI, 2004).

2.3 PHYSICAL SETTING AND CLIMATE

NAVWPNSTA Seal Beach is situated at latitude 33° 45' 27" and longitude 118° 4' 22", San Bernardino Baseline and Meridian. NAVWPNSTA Seal Beach is located within the Los Angeles-Orange County coastal plain. This northwest-trending structural basin is approximately

50 miles long and 20 miles wide with deposits as much as 20,000 feet thick. Basin morphology was developed through the mechanisms of folding, faulting, erosion, and fluctuating sea levels (JEG, 1994).

Most of NAVWPNSTA Seal Beach lies on predominantly flat alluvial deposits in the southeastern portion of the Los Angeles Basin. The Los Angeles Basin is bounded on the north by the Santa Monica Mountains; on the northeast by the Repetto and Puente Hills; on the east and southeast by the Santa Ana Mountains and the San Joaquin Hills; and on the south, southwest, and west by the Palos Verdes Hills and the Pacific Ocean. The land at NAVWPNSTA Seal Beach slopes evenly from approximately 20 feet above sea level in the northwestern part of NAVWPNSTA Seal Beach to sea level in the tidal flats of the Seal Beach National Wildlife Refuge (SBNWR) in the southeast (Figure 1-2). The most pronounced topographic feature at NAVWPNSTA is part of Landing Hill on the southwest. Landing Hill reaches a maximum elevation of about 50 feet (JEG, 1994).

The area climate is classified as a marine-influenced southern California coastal region with mild winters that average 52 degrees Fahrenheit (°F) and summers that average 68 °F. Temperature ranges from winter lows in the 30s °F to summer highs in the 90s °F. Annual precipitation averages 12.5 inches, with approximately 90 percent occurring between the months of November and April. Although precipitation is low, a high humidity level is sustained because of the proximity of the Pacific Ocean (JEG, 1994). Prevailing winds average 3.8 miles per hour from the west. Occasional strong, dry winds from the northeast, known as the “Santa Anas,” occur in the fall, winter, and early spring (JEG, 1994).

2.4 REGIONAL GEOLOGY/HYDROLOGY/HYDROGEOLOGY

Regional geology and hydrogeology is summarized in the remainder of this subsection. The FS (BEI, 2000) provides more details.

2.4.1 Regional Geology

Affected substrate at NAVWPNSTA Seal Beach is primarily Recent Age (Holocene) alluvial deposits within the Los Angeles Basin. Sources for this alluvium were the ancestral Los Angeles, San Gabriel and Santa Ana Rivers, and Upper Pleistocene sand and clay deposits. The ancestral rivers cut trenches through the rising Newport-Inglewood uplift to depths from 120 to 180 feet below mean sea level. Soils at NAVWPNSTA Seal Beach contain abundant clay and silt and are poorly drained. Six soil types have been identified. The Bolsa series [Soil Conservation Service (SCS), 1978] covers approximately two-thirds of NAVWPNSTA Seal Beach including IRP Site 40 (JEG, 1995). These soils are somewhat poorly drained, moderately alkaline, and calcareous and have developed from largely flat alluvial and coastal deposits. The soils extend to approximately 49 inches below ground surface (bgs) and are moderately to slowly permeable.

Stratigraphic sequence underlying NAVWPNSTA Seal Beach, from youngest to oldest, is:

- Recent alluvium
- Upper Pleistocene Lakewood Formation
- Lower Pleistocene San Pedro Formation
- Pleistocene Pico Formation

Maximum thickness of recent deposits in the region is approximately 80 to 100 feet. The upper 50 feet of this unit consists of fine sands, silty clays, and clays, while the lower unit consists of alluvial sands and gravels, silty sands, silty clays, and clays. Transitional, shallow marine, and fluvial deposits of great variability are part of the Upper Pleistocene sand and clay deposits, starting at approximately 80 to 100 feet. Units are discontinuous and contain zones of high and low permeability. The maximum thickness of the Lakewood Formation is approximately 350 feet in the city of Lakewood (California Department of Water Resources [DWR], 1961).

2.4.2 Hydrogeology

NAVWPNSTA Seal Beach is located at the southwestern corner of the Orange County Basin of the Los Angeles Groundwater Basin. The Orange County Basin contains the Artesia, Gage, Hollydale, Jefferson, Lynwood, and Silverado aquifers. The Lynwood and Silverado aquifers are merged across most of the NAVWPNSTA (JEG, 1994).

There are four general aquifer zones (JEG, 1994):

- A semi-perched, unconfined zone within the upper recent alluvial deposits
- A confined fresh groundwater zone contained in lower recent alluvial deposits
- Late and Early Pleistocene deposits of the Lakewood and San Pedro formations, respectively, and deposits of the Late Pliocene Pico Formation in some parts
- A confined zone of saline water underlying the freshwater zone

The principal freshwater body tapped to supply NAVWPNSTA Seal Beach is a large confined aquifer occupying two zones. The first zone is about 75 to 200 feet deep and saline; and it is no longer used for water supply. The second zone is approximately 250 to 1,000 feet deep. This aquifer is the primary water supply source both for the NAVWPNSTA and neighboring cities (JEG, 1994).

The groundwater underlying the NAVWPNSTA is within the Lower Santa Ana River Groundwater Basin (Orange County Groundwater Management Zone) (California Regional Water Quality Control Board [RWQCB], Santa Ana Region, Resolution R8-2004-001). Beneficial uses of groundwater within the Orange County Groundwater Management Zone include municipal and domestic supply, agricultural, industrial service supply, and industrial process supply. Currently, shallow groundwater underlying IRP Site 40 does not serve as a water source for any of the beneficial uses designated in the *Water Quality Control Plan, Santa Ana River Basin* (Basin Plan) (RWQCB, 1995).

Groundwater levels in the principal freshwater zone fluctuate from year to year because of variations in pumping, infiltration, and recharge. Recharge to this aquifer is primarily from unconfined upgradient areas, and from unlined rivers that are hydraulically connected to the aquifer. Seasonal variations occur with highs in the wet winter months and with lows in the dry summer months when large quantities of water are used for irrigation (JEG, 1994).

2.5 SITE CONDITIONS

This section presents general information on site conditions at IRP Site 40, including observed geologic units, conceptual model, aquifer test results, groundwater flow, general groundwater chemistry, nature and extent of contamination, and contaminant fate and transport. See the FS (BEI, 2000) for more details.

IRP Site 40 is contaminated primarily with chlorinated solvents. The site has a region of soil contamination and a groundwater contaminant plume to approximately 66 feet bgs. The lateral and vertical extent of the plume has been delineated. The groundwater gradient is relatively flat, and movement of the plume in groundwater is relatively slow. The sediments span a wide range of lithologies and grain sizes (see cross sections in the FS [BEI, 2000]).

2.5.1 Geologic Units

The geologic units observed at IRP Site 40 are as follows (BNI, 1999).

- Surficial soils - Silty sands and clayey sands, as well as sandy clay and clays, with considerable lithological variation laterally
- First sand unit - Sands to silty sands within a few feet of the water table extending to 7.5 to 10 feet bgs
- Second sand unit - Saturated sands to silty sands at 9 to 21 feet bgs, extending to 28 to 41 feet
- Third sand unit - Saturated sands to silty sands at 38 to 52 feet bgs, depending on the location

Lower permeability intervals containing clay, silty clay, and silt separate the coarser-grained units noted above.

2.5.2 Conceptual Model

The site physical conceptual model (Figure 2-1) generally represents the location and assumed lateral continuity of the hydrostratigraphic units beneath the IRP Site 40 vicinity. The model incorporates the uppermost soil layer, approximately 80 feet bgs, which includes Late Pleistocene sediments of the Lakewood Formation. The model was developed during the ERSE (BNI, 1999).

2.5.3 Aquifer Tests/Groundwater Flow

The hydraulic conductivities of screened intervals in selected ERSE groundwater monitoring wells were determined on the basis of aquifer (slug) tests (BNI, 1999). Hydraulic conductivity values, highest for the shallowest well and lowest for the deep interval wells, were as follows:

- Shallow depth (9.5 to 20.5 feet bgs), 91.01 to 103.53 feet per day
- Intermediate depth (20.0 to 30.3 feet bgs), 28.56 to 54.13 feet per day
- Deeper zone (45 to 55 feet bgs), 2.96 to 20.20 feet per day

All of these hydraulic conductivity values are typical of published values for unconsolidated silty sands to sands (Freeze and Cherry, 1979).

Based on a tidal influence study from the ERSE, water levels are locally tidally influenced (BNI, 1999). The data indicated that the water table occurred at an approximate depth of 8 to 9 feet bgs. There are no continuous shallow confining layers evident at IRP Site 40.

The varying effects of tidal lag time and head differences are seasonal. In October 1997, head difference between well pairs ranged from 0.04 to 0.08 foot. Pressure response from tidal fluctuations varied from 0.1 to 0.2 foot in wells. Groundwater-level contours for intermediate-depth monitoring wells showed the hydraulic gradient direction is to the southeast, toward the tidal marsh. The average gradient magnitude is approximately 0.0002. Groundwater-level contours for deeper monitoring wells indicate that the overall hydraulic gradient direction is to the southeast, toward the tidal marsh; however, the gradient direction between individual wells varies. The average gradient magnitude was also approximately 0.0002. Head differences of -0.02 to -0.14 foot between well pairs indicate a downward vertical gradient. Seasonal influences appear to change the groundwater surface levels in all three zones, although the direction does not change, and the gradient changes relatively little.

2.5.4 General Groundwater Chemistry

General groundwater chemistry data (BNI, 1999) indicate:

- Groundwater at IRP Site 40 appears to vary from fresh to brackish, based upon total dissolved solids (TDS) data.
- Chloride appears to be the major anion present in groundwater.
- Major cations include sodium, calcium, and magnesium.
- Minor amounts of dissolved gases (methane and ethene) are present.

- Based on alkalinity values, groundwater appears to be generally hard to very hard.
- Dissolved iron is locally present up to about 6 milligrams per liter (mg/L).
- Total organic carbon (TOC) is present locally; the highest concentrations were reported in a center-of-plume location within the defined boundary of the VOC plume.
- Specific conductance indicates that shallow groundwater underlying the site ranges from fresh to brackish to slightly saline.
- pH values suggest that the groundwater is slightly basic.
- Dissolved oxygen (DO) and oxidation/reduction potential (ORP) data indicate moderately reduced to reduced conditions.
- Ferrous iron is locally present.

2.5.5 Nature and Extent of Contamination

Previous investigations identified the potential sources of contamination at IRP Site 40. The SI identified a release to groundwater of the COPCs carbon tetrachloride and PCE (JEG, 1995). The FSI report concluded that a plume of chlorinated hydrocarbons containing PCE, TCE, and 1,2-DCE at levels exceeding MCLs exists beneath the site (JEG, 1996). The FSI delineated the lateral extent of the plume in the shallow groundwater as approximately 270 feet by 200 feet, but did not determine a vadose-zone source.

BNI further investigated soil contamination at IRP Site 40 during the ERSE (BNI, 1999). The ERSE concluded that the potential for continued leaching of soil COPCs to groundwater is low to negligible. Releases of chlorinated solvents migrated through the soil, resulting in a groundwater plume containing primarily PCE with lesser concentrations of TCE, cis-l,2-DCE, trans-1,2-dichloroethene (trans-l,2-DCE), and chloroform. However, concentrations of these VOCs in the vadose-zone soil indicate most of the original releases have already leached to groundwater or volatilized to the atmosphere (BNI, 1999). The potential for transport of soil COPCs through runoff is low to negligible. The ERSE further concluded that human-health risk for soils is below the NCP-defined departure point, and site development should not adversely impact ecological receptors (BNI, 1999).

The lateral and vertical extent of the groundwater contaminant plume, consisting largely of VOCs, has been delineated (BNI, 1999). PCE is present at depth intervals of less than 20 feet, 20 to 45 feet, and greater than 45 feet (Figures 2-2 through 2-4, respectively). PCE and TCE concentrations in groundwater as of March 2003 are shown in Figure 2-5. See the FS (BEI, 2000) for more details.

2.5.6 Contaminant Fate and Transport

The ERSE (BNI, 1999) concluded the following:

- The potential for continued leaching of soil COPCs to groundwater is low to negligible.
- There is a negligible potential for COPCs to have migrated deeper than that determined by the ERSE sampling. Downward migration of CVOCs apparently has been limited to approximately 66 feet bgs (BNI, 1999).
- A slight downward gradient was indicated by the typical head difference of 0.1 to 0.2 foot at well pairs in October 1997, thus the potential for downward migration exists. Based on the absence of significant concentrations of CVOCs below the second Interbedded Unit, the slight downward gradient has not caused an impact at lower intervals.
- Significant biodegradation of PCE has occurred, and conditions are conducive to continued degradation; therefore, natural attenuation will continue to reduce existing VOC concentrations.
- The potential for the COPC plume to reach the SBNWR boundary at concentrations exceeding acceptable levels is low because of lithologic controls on groundwater flow and the apparent degradation taking place.

The FS (BEI, 2000) further discusses the fate and transport characteristics of contaminants at IRP Site 40.

2.5.7 Summary of Risk Analysis

The ERSE concluded that no complete exposure pathway exists between chemicals in groundwater and ecological receptors at IRP Sites 40. Thus, chemicals reported in groundwater were not evaluated further for ecological risk.

For the human-health screening risk assessment, COPCs were screened by comparing their maximum reported concentrations in soil and groundwater with concentrations representing a level of acceptable risk. The basic tenet of this approach is that the risk presented by a given concentration of a chemical is acceptable when it does not exceed the concentration established by regulatory agencies.

Detailed results for the human-health screening risk assessment are presented in the FS (BEI, 2000) and summarized as follows for IRP Site 40.

The human-health risk screening for IRP Site 40 groundwater estimated a total cancer risk of 4.1×10^{-3} and a hazard index of 85, resulting primarily from PCE and TCE. Approximately 88 percent of the total cancer risk is from PCE, and 85 percent of the total hazard index is from PCE and TCE.

3.0 TECHNICAL APPROACH AND METHODS

This section outlines the technical approach and methods used in implementing and assessing the EISB process, including remedial system design, system overview, well installation, and implementation/performance monitoring details.

Implementation of EISB to remediate groundwater contamination at IRP Site 40 consists of the following:

- An array of injection wells sufficient to disperse reagent (sodium lactate) and *Dehalococcoides* spp. (DHC) throughout the saturated zone
- A reagent injection system to deliver the sodium lactate to the injection array
- A mechanism for injection of commercially available DHC culture (KB-1) and/or extraction and reinjection of DHC-laden groundwater
- A monitoring well network to adequately monitor target parameters

Other components of the EISB system will include:

- Vapor monitoring wells to monitor potentially produced gases (methane, VC, and hydrogen sulfide)

3.1 REMEDIAL SYSTEM DESIGN

This section discusses the design concepts and criteria and other specifics with respect to the rational for the selection of injection and monitoring well locations and other elements of the full-scale EISB system.

3.1.1 Rationale and Design Concepts

The design of the full-scale EISB was developed based on the results of a pilot test that was conducted by BEI to assess lactate addition to groundwater to enhance the dechlorination of PCE and TCE at IRP Site 40. The BEI pilot test report provided the following site-specific information on EISB that was used to design the full-scale implementation system:

- Lactate addition drives reductive dechlorination of PCE and TCE.
- A radius of influence (ROI) of 25 feet downgradient and 20 feet cross-gradient at one well, using an injection rate of 4 gallons per minute (gpm) of a 3 percent sodium lactate solution at a frequency of 8 hours of injection for 2 days per week, for 8 weeks is needed.
- Bioaugmentation with DHC is required to degrade the DCE and VC that form from the dechlorination of PCE and TCE.
- Distribution of the inoculum throughout the plume may be required.

This information was used to scale up the system from a one-well pilot-scale study to a multi-well full-scale application. Therefore, the full-scale design was intended to provide:

- Engineering specifications for a full-scale system that will sufficiently dose the identified contaminant plume in groundwater with lactate.
- Application parameters for full-scale lactate dosing (using 3 percent sodium lactate solution) including injection rate, frequency, and duration.
- Engineering specifications for a full-scale inoculum injection system and distribution system.
- An operations plan to describe how the system will be operated.
- A performance monitoring plan to demonstrate the effectiveness of the system.

3.1.2 Well Field Design for Injection, Monitoring, and Soil Vapor Wells

The following subsections discuss the rational for the injection well, groundwater monitoring well and soil vapor/gas monitoring well field design and arrangement.

3.1.2.1 Injection Well Field Design

The well injection network is shown in Figure 1-3. The original injection well network consisted of 17 injection wells (IW-1 through IW-17) using ROI design criteria of 25 feet downgradient and 20 feet cross-gradient. Two additional injection wells (IW-18 and IW-19) were installed approximately 5 months after the project commenced, based on the detection of CVOCs in the vicinity of MW-40-07, which is located downgradient from the injection well field (refer to Figure 1-3).

The justification for placement of the injection wells is as follows:

- Injection wells IW-1 and IW-2 were placed upgradient of Building 240 to achieve lactate dosing underneath this structure; similarly, injection wells IW-9, IW-10, and IW-15 were placed upgradient of Building 239 to achieve lactate dosing underneath this structure.

- Injection wells IW-3 through IW-9, IW-12, IW-13, and IW-14 were placed to achieve lactate dosing of the current and historic plume “hot spots”. Existing monitoring well MW-40-27 was converted and used as an injection well and designated as IW-5. This well was installed as part of the pilot test program and has a screen interval of 15 to 35 feet bgs and has the same depth and construction specifications as the other injection wells.
- Injection wells IW-11, IW-15, IW-16, and IW-17 were placed downgradient of the initial 100-µg/L contour lines to achieve lactate dosing of groundwater that may potentially be displaced downgradient as a result of the injection of high volumes of solution at the areas of the plume with the greatest impact.

- Injection wells IW-18 and 19 (as noted above) were installed approximately 5 months after the project commenced and are intended to provide dosing in the vicinity of MW-40-07, which is located downgradient from the initial injection well field.

The initial strategy was to inject lactate into the well field by group. The injection well field was divided into two groups of six wells and one group of five wells for a total of three groups. Each group was dosed for 2 days per week; therefore, dosing will occur over a 6-day period per week. Wells were not grouped by proximity, but by the opposite criterion – by maximization of the spacing between wells. This strategy of grouping wells with maximum spacing was designed to minimize flow interference between injection wells and thus achieve closer to ideal radial flow at each well.

3.1.2.2 Monitoring Well Field Design

Based on the size of the PCE-impacted groundwater area and the number of injection wells, the previously existing 13-well network (40-MW-03, -05, MW-40-07, -08, -12, -14, -15, -16, -17, -18, -19, -20, and -21) was considered inadequate for monitoring within the main VOC-impacted areas. These wells are all located outside the injection well field, with exception of well 40-MW-14. Ten additional groundwater monitoring were constructed to improve monitoring efficiency. Eight wells were constructed with a shallow interval screen (15 feet to 35 feet bgs); and two wells were constructed with screens placed from 45 feet to 55 feet bgs. The locations of the wells are shown on Figure 1-3. Table 3-1 lists all the wells at the site and data for the screen intervals and depth.

The purpose of the monitoring well network is to demonstrate:

- Effective delivery of lactate
- The degradation of COCs to daughter products
- The concentrations of DHC throughout the plume
- Sulfate-reducing and methanogenic conditions throughout the plume
- Changes in hydraulic head as a result of the lactate injection

The general rationale for the locations of the monitoring wells is to allow for monitoring for the aforementioned conditions at various radial distances in the upgradient, downgradient, and cross-gradient directions. By having this capability, a general assessment can be made as to the effectiveness of the method in delivering adequate amounts of lactate throughout the plume, particularly at distances medially located between injection wells.

The justification for the location of each new monitoring well is summarized as follows:

- MW-40-30 (shallow) is used to monitor for adequate dosing medially between injection wells IW-4, IW-8, and IW-9 in the hot spot area according to the design ROI.

- MW-40-31 (middle) is used to monitor for vertical migration of contaminants into the deeper portion of the WBZ and to assess the degree of lactate dosing in the deeper portion of the WBZ.
- MW-40-32 (shallow) is used to monitor for adequate dosing medially between injection wells IW-9 and IW-10 according to the cross-gradient design ROI.
- Existing MW-40-14 (shallow) was used to monitor for adequate dosing downgradient of injection wells IW-5 and IW-6.
- MW-40-33 (shallow) is placed southeast of injection well IW-11, south of injection well IW-12, and west/southwest of injection well IW-16. The data from this well is used to show if contaminants are being displaced outward due to high-volume injection in the hot spot area.
- MW-40-34 (shallow) is used to monitor for adequate dosing medially between injection wells IW-13, IW-16, and IW-17 according to the design ROI. Additionally, the data from this well will show if contaminants are being displaced outward due to high-volume injection in the hot spot area.
- MW-40-35 (middle) is used to monitor for vertical migration of contaminants into the deeper portion of the WBZ and to assess the degree of lactate dosing in the deeper portion of the WBZ.
- MW-40-36 (shallow) is used to monitor for adequate dosing medially between injection wells IW-7, IW-8, IW-14, and IW-15 in the hot spot area according to the design ROI.
- MW-40-37 (shallow) monitors for adequate dosing 20 feet downgradient from IW-15 according to the design ROI. Additionally, the data from this well will show if contaminants are being displaced outward due to high-volume injection in the hot spot area.
- MW-40-38 (shallow) was installed northeast of injection well IW-4, north of injection well IW-9 and northwest of injection well IW-10. MW-40-38 is located approximately 70 feet north of injection well IW-9. The data from this well will be used to show if contaminants are being displaced outward due to high-volume injection in the hot spot area.
- An additional shallow well, designated as MW-40-39, was installed for further monitoring of the plume downgradient of well MW-40-07. This well is located approximately 100 feet downgradient and southeast of existing monitoring well MW-40-07 and approximately 70 feet south of Building 239.

As necessary, some of the previously existing monitoring wells were also used for groundwater monitoring and to assess the effectiveness of the lactate delivery. Information regarding existing monitoring wells is summarized below.

Wells 40-MW-01 and 40-MW-02 are shallow (20 feet deep and screened from 6 feet to 16 feet bgs). These wells provide information regarding the lactate dispersion in injection wells IW-1 and IW-2, and with regards to the contaminant concentrations in groundwater limited within the depth of less than 20 feet bgs.

MW-40-06, -07, -08, -15, -17, and -19 are shallow wells (approximately 34 feet deep) and are screened from approximately 20 feet to 30 feet bgs. These wells are used to monitor the contaminant concentrations and assess the remediation effectiveness in groundwater within the 20 feet to 35 feet bgs. MW-40-06 is located upgradient of the injection well field, and the remaining wells are located downgradient of the injection well field.

Existing monitoring wells MW-40-10, and -13 are middle interval wells that are approximately 58 feet deep and are screened from approximately 42 feet to 55 feet bgs. These wells were used to monitor the contaminant concentrations and assess the remediation effectiveness in groundwater within the deeper zone (50 feet to 60 feet bgs). MW-40-10 is located upgradient of the injection well field, and monitoring well MW-40-13 is located downgradient of the injection well field. The monitoring and sampling frequency of the existing wells are further discussed in Section 4.11.

3.1.2.3 Soil Vapor/Gas Monitoring Well Field Design

Pilot test results indicated the need to monitor soil gas concentrations. There were two existing soil gas monitoring wells (VW-40-01 and VW-40-02) at IRP Site 40. Four additional soil vapor wells were installed. The soil vapor wells are used to monitor levels of methane, hydrogen sulfide, and VC in the vadose zone. The locations of the soil vapor wells are shown on Figure 1-3.

The justification for the locations of the soil vapor wells is as follows:

- VW-40-3 is for vapor monitoring in the hot spot area near Building 240.
- VW-40-4, VW-40-5, and VW-40-6 are for vapor monitoring near Buildings 239 and 260.

In addition, a nested probe for monitoring soil gas concentrations was installed in each of the injection and groundwater monitoring well boreholes. A nested probe was installed adjacent to the injection or monitoring well casings. The injection well and groundwater monitoring well as-built details are described in Section 4.7.2. The probes are used for field monitoring of the soil gas concentrations including methane and hydrogen sulfide and for collecting soil gas samples for laboratory analysis.

3.1.2.4 Sodium Lactate

Sodium lactate is the selected substrate to stimulate the microbial activity and accelerate reductive dechlorination rates. Sodium lactate enhances microbial growth, which increases the rate of anaerobic biodegradation of chlorinated ethenes in groundwater.

Sodium lactate in solution is comprised of sugars and water that have undergone a fermentation process. Sodium lactate (chemical formula is $C_3H_5O_3Na$) is a colorless and odorless liquid (Mallinckrodt Baker, Inc., 1999) and is completely soluble in water. It has a molecular weight of 112.07 grams per mole and a specific gravity of 1.31. Sodium lactate has a boiling point of 113 degrees Celsius (°C) (235 °F) and a melting point of 17 °C (63 °F). It is stable under ordinary conditions of use and storage. Sodium lactate is a nonproprietary, environmentally safe substance.

3.1.3 Bioaugmentation Details

Phase I pilot test analytical results indicated that biological activity was stimulated, but the reductive dechlorination process was incomplete. PCE and TCE were reduced to DCE, but DCE was not reduced further to VC or ethene. Evidence suggested that an appropriate microbial consortium for complete reductive dechlorination was not present at the site. It was then determined that bioaugmentation (introduction of microorganisms not indigenous to the site) would be tested during a Phase II pilot test.

This involved injecting an environmentally benign, commercially available bacterial culture into the saturated zone. The culture, KB-1, was obtained from Site Recovery & Management (SiREM) of Guelph, Ontario, Canada. The KB-1 culture has proven capable of complete anaerobic dechlorination and contains DHC organisms. The KB-1 culture was injected into wells MW-40-22 and MW-40-25 during Phase II pilot test. Phase II pilot test analytical results indicated that the reductive dechlorination process proceeded past DCE to VC and ethane, thus indicating that bioaugmentation is required to accomplish complete reductive dechlorination at IRP Site 40.

Pilot test data indicated that the organisms are spread by growth and migration at IRP Site 40, and adequate distribution can be achieved by adding a commercially available inoculum into the injection wells, or by extracting groundwater from the existing pilot test wells that contain DHC and reinjecting the water into the injection wells. Thus, an initial attempt was made to transfer water form the existing pilot test well to the injection wells. This was largely unsuccessful (as explained in Section 4.11.13), and thus, bioaugmentation with fresh KB-1 culture was performed as discussed in Section 4.11.14.

4.0 FIELD ACTIVITIES

This section provides a detailed description of the specific field activities that were performed during the remedial action. The initial phase of the field activities included the installation of the monitoring and injection wells and construction of the sodium lactate solution delivery system to the aquifer. These activities followed the procedures discussed in the Work Plan (TtEC, 2005). The initial phase also involved delivery of the sodium lactate to stimulate the activity of indigenous microorganisms. Groundwater monitoring was conducted to evaluate progress. TtEC mobilized at IRP Site 40 on February 15, 2005.

The following is a list of the activities performed during the construction phase of IRP Site 40 remedial action:

- Preparatory activities including procurement and notifications
- Survey and staking of well locations
- Geophysical survey to identify the location of underground utilities
- Installation of temporary security fencing around the site
- Mobilization and setup of an office facility and portable sanitary facilities
- Drilling, installation and development of groundwater monitoring and injection wells, and soil vapor/gas monitoring wells and probes
- On-site containerization, sampling, analysis, classification, loading, transportation, and disposal of drill-cutting soil and wastewater
- Construction of the sodium lactate delivery system, including the portable cart-mounted Dosatron assemblies
- Installation of hoses and fittings and hookup to the existing tap water and fire hydrant sources to provide water for injection
- Baseline sampling and analysis of groundwater samples
- Biostimulation (sodium lactate injection) Round 1
- Biweekly and monthly field testing and monthly sampling and laboratory analysis of groundwater samples
- Bioaugmentation (recirculation of DHC-laden water from IW-5) and injection of KB-1
- Biostimulation (sodium lactate injection) Round 2

Further details are described in Subsections 4.2 through 4.14.

4.1 PROJECT MANAGEMENT

This section provides an overview of the project management team that is responsible for all technical and administrative aspects of the removal action. Included among the team's responsibilities are the project schedule, staffing, data management, document control, project meetings, and reporting.

The DON Remedial Project Manager (RPM) for this project is Mr. Si T. Le. Mr. Le was responsible for project management, budget control, schedule maintenance, and contacting regulatory agencies. Ms. Pei-Fen Tamashiro is the NAVWPNSTA Installation Restoration (IR) Program Coordinator. Ms. Tamashiro was responsible for community relations and ensuring that the field and remedial activities were in compliance with the applicable rules and regulations. Mr. David Crawley is the Resident Officer in Charge of Construction (ROICC) and was responsible for the technical oversight of field activities, coordination of field activities with different NAVWPNSTA Seal Beach departments and personnel, and quality control (QC).

TtEC's Deputy Program Manager (DPM), Dr. Jamshid Sadeghipour, PE, has been responsible for general project administration in order to ensure the quality of all project activities and deliverables. As TtEC's Project Manager, Mr. Hamlet Hamparsumian's responsibilities included general project administration, overseeing budget and schedule, document preparation, and ensuring the quality of all project activities and deliverables. Mr. Glenn Nardin was the Project Superintendent during the field activities and was responsible for managing the fieldwork, providing oversight to the subcontractors, coordinating efforts among all vendors, coordinating the field activities with the senior technical staff, and coordinating the field activities with the Site Health and Safety Specialist (SHSS).

The following is a list of the key contacts:

Agency	Contact	Title
NAVFAC SW 1220 Pacific Highway San Diego, CA 92132-5190	Si T. Le (619) 532-1235	DON RPM
NAVWPNSTA Seal Beach 800 Seal Beach Boulevard Building 110 Seal Beach, CA 90740-5000	Pei-Fen Tamashiro (562) 626-7897	NAVWPNSTA IR Program Coordinator
ROICC Los Angeles NAVWPNSTA Seal Beach Building 230 Seal Beach, CA 90740-5000	David Crawley (562) 626-7964	ROICC

Agency	Contact	Title
Cal/EPA Department of Toxic Substances Control (DTSC) Office of Military Facilities 5796 Corporate Way Cypress, CA 90630	Katherine K. Leibel (714) 484-5446	DTSC RPM
California Water Quality Control Board, Santa Ana Region 3737 Main Street, Suite 500 Riverside, CA 92501-3348	Patricia Hannon (951) 782-4498	California Water Quality Control Board, Santa Ana Region RPM
TtEC 1940 East Deere Avenue, Suite 200 Santa Ana, CA 92705	Jamshid Sadeghipour (949) 756-7519	DPM
TtEC 1940 East Deere Avenue, Suite 200 Santa Ana, CA 92705	Hamlet Hamparsumian (949) 756-7520	Project Manager
TtEC 1940 East Deere Avenue, Suite 200 Santa Ana, CA 92705	Mary Schneider (949) 756-7586	QC Program Manager
TtEC 1940 East Deere Avenue, Suite 200 Santa Ana, CA 92705	Mark Losi (949) 756-7516	Senior Microbiologist
TtEC 1940 East Deere Avenue, Suite 200 Santa Ana, CA 92705	Michael Toy (949) 756-7532	Senior Project Engineer (Civil/Remediation Engineer)

4.2 SUBCONTRACTING/PROCUREMENT

All field activities were performed under the direct supervision of TtEC with assistance from specialty subcontractors. The procurement of the subcontractors and required services and materials were performed in a manner consistent with the terms of the contract and applicable Federal Acquisition Regulations.

Several specialty subcontractors were procured to assist in specific aspects of the removal activities. These subcontractors included a geophysical survey contractor; civil survey contractor; drilling subcontractor; waste hauler/transporter; treatment, storage and disposal facility (TSDF); and an analytical laboratory.

Drilling, well installation and development was conducted by Water Development Corporation located in Montclair, California. The waste hauler/transporter was Denbeste Transportation, Inc. (Windsor, California), which was responsible for the transportation of the drill cutting and wastewater to the Chemical Waste Management, Inc. disposal facility located in Kettleman City, California.

EMAX Laboratories, Inc. (EMAX), located in Torrance, California, performed the required VOCs, semivolatile organic compounds (SVOCs), general chemistry analysis on the groundwater samples. Other laboratories included Microbial Insights, Inc. of Rockford, Tennessee; Microseep of Pittsburgh, Pennsylvania; Colombia Analytical Services, Inc. of Simi Valley, California; and Environmental Analytical Services, Inc. of San Luis Obispo, California. The above laboratories performed DHC analysis, dissolved hydrogen analysis, hydrogen sulfide analysis, and soil vapor VOCs and fixed gasses analysis, respectively.

Ron Martin and Associates of San Clemente, California, was responsible for land surveying. ULS Services, Inc. (Pocatello, Idaho) was responsible for performing the geophysical survey. Vendor procurement involved leasing office furniture, portable sanitary facilities, and a temporary container. Other miscellaneous equipment such as sampling and testing equipment, construction tools, polyethylene liners, and sandbags, were procured on an as-needed basis. Other major vendors included JRW Bioremediation, LLC, of Lenexa, Kansas, from which sodium lactate was procured, QED Environmental Systems (QED) of Philadelphia, Pennsylvania, for procurement of bladder pumps and injection well packers, and Chemco Products Company of Paramount, California, for procuring the Dosatrons and injection system equipment and instruments.

4.3 PREPARATORY ACTIVITIES AND MOBILIZATION

A kickoff meeting was held on February 10, 2005. The attendants included NAVWPNSTA Seal IR Program Coordinator, ROICC, Station Public Works representative and the Fire Department and Security representatives, TtEC Project Manager, TtEC geologist and TtEC Project Superintendent. The meeting included discussion regarding contractor QC details, administration of the on-site work, coordination of the construction management and other field activities with other works being conducted near and around the site, and submittal of daily production and QC reports.

Prior to mobilization, the appropriate DON personnel, including the RPM, NAVWPNSTA IR Program Coordinator, and the ROICC, were notified about the planned schedule for mobilization and remediation activities. Upon receipt of authorization, field personnel and temporary facilities were mobilized to the site.

Mobilization activities included site preparation, movement of equipment and materials to the site, and training and site orientation of field personnel. Mobilization of temporary facilities included office furniture, temporary storage trailer, portable restrooms, a trash bin, an eyewash station, and a hand wash sink. The facilities were located near Building 240. Building 240 was used as a temporary field office.

4.4 NOTIFICATIONS

Prior to the removal activities, the ROICC and the RPM were contacted by TtEC to inquire about any NAVWPNSTA permits for the activities at IRP Site 40, based on the nature of the anticipated work. No NAVWPNSTA permits were required. Underground Service Alert was also notified to obtain utility clearance prior to excavation activities.

No permits for temporary stockpiling of hazardous waste were necessary as the drill cutting soils and wastewater material were classified as non-hazardous and were not stored on site for more than 90 days.

4.5 LAND SURVEY

Prior to the start of intrusive activities, each proposed new well location was marked with survey stakes and clearly identified. The initial staking of the well locations was conducted on February 15, 2005. Following installation, the as-built locations and elevations of the wells were surveyed on March 11, 2005. Well casing elevations were surveyed to the nearest 0.01 foot. The reference point was a notch on the top of each well casing. Horizontal control conforms to the California State Plane Coordinates system, North America Datum, 1983. Vertical control conforms to National Geodetic Vertical Datum, 1929. Ron Martin and Associates of San Clemente, California, a California-licensed land surveying contractor, performed the land surveying under the direction of TtEC.

4.6 UTILITY CLEARANCE AND GEOPHYSICAL SURVEY

Prior to the installation of the wells, the well locations were surveyed and staked in the field, and underground utility clearance was completed before well drilling and installation. Each of the well locations were cleared using the following protocol:

1. Review the latest version of the as-built drawings related to the site.
2. Perform a site reconnaissance to locate utilities on as-built drawings and find evidence of undocumented utilities.
3. Mark the proposed well locations and evaluate the presence of other physical constraints.
4. Use ground-penetrating radar (GPR)/electromagnetic geophysical equipment and procedures to trace underground utility lines or other potential obstructions.
5. Clear at least 10 feet all around each proposed well location and mark the cleared areas.
6. Mark the utility lines using color-coded surveyor paint.
7. After pavement is cored, advanced the first 5 to 6 feet of each boring with a hand auger before advancing to greater depths with the drill rig.

If a utility was identified within 3 feet of the proposed drilling location, the drilling point was removed and the clearance procedures were repeated.

Prior to conducting the geophysical survey, NAVWPNSTA Seal Beach utility maps were reviewed. Using the existing as-built utility maps provided by the NAVWPNSTA Seal Beach, TtEC conducted a site reconnaissance to locate utilities that are shown on the as-built drawings in order to find evidence of any undocumented utilities.

On February 17 and 18, 2005, ULS Services, Inc., performed a geophysical survey at IRP Site 40 to assist in marking the locations of any known or unknown underground utilities at the site prior to drilling and conducting intrusive work. Electromagnetic line location equipment was used during the survey. The results of the geophysical survey were compared with the available as-built drawings obtained from the ROICC's office and the NAVWPNSTA Seal Beach Public Works Center to determine if any undocumented utilities or other features existed in the surveyed area. Appropriately colored paints were used to mark the identified utilities within the vicinity of the planned excavation areas. Active utilities present within the areas where wells were to be drilled prior to any intrusive work were marked. A 10-foot by 10-foot area around each well location was swept using GPR and/or an electromagnetic induction (EMI) instruments and marked as clear where appropriate. Other physical constraints that were present near or in the vicinity of the proposed well locations were evaluated and based on this evaluation several of the proposed well locations were adjusted. When a utility was identified within 3 feet of the proposed drilling location, the drilling point was moved and the clearance procedure was repeated.

4.7 WELL INSTALLATION AND DEVELOPMENT

Sixteen injection wells, eight groundwater monitoring wells, and four soil vapor/gas monitoring wells were installed at IRP Site 40, in the period between February 23 and March 11, of 2005. Two additional injection wells (IW-18 and IW-19) were installed on August 19, and September 10, 2005, respectively, making the total number of injection wells installed 18.

Drilling at each well location was initiated by hand-auguring to a depth of approximately 6 feet bgs to minimize the risk of encountering underground utility lines that may have escaped detection during the utility and geophysical clearance efforts. Once a depth of 6 feet was reached, the drill rig was positioned over the boreholes to advance the boreholes to the desired depths.

4.7.1 Drilling Activities

Monitoring well boreholes were drilled using a truck-mounted drilling rig equipped with continuous flight, hollow-stem augers. The drill cuttings were observed continuously as the boreholes were drilled for soil classification, and the lithology encountered during drilling of the soil borings was recorded on boring logs. Boring logs are included as Appendix A. Borehole logging was conducted by a geologist under supervision of a State of California-registered Geologist. Soil samples were classified using Unified Soil Classification System (USCS). Soil classification consisted of an evaluation of physical characteristics such as grain size, soil type, and moisture content.

4.7.2 Injection Well and Groundwater Monitoring Well Construction Details

Eighteen injection wells and eight groundwater monitoring wells were installed. Of the eight groundwater monitoring wells, six are shallow interval and two are middle interval wells. The shallow-interval groundwater monitoring wells and the injection wells were constructed with the screened interval placed from approximately 15 to 35 feet bgs. The middle-interval groundwater monitoring wells were constructed with the screened interval placed from approximately 45 to 55 feet bgs. The construction details for the injection wells and the groundwater monitoring wells are typical and only vary slightly between wells based on encountered subsurface and drilling conditions. Twelve-inch-diameter hollow-stem augers were used for drilling the boreholes for the construction of the injection wells IW-1 through IW-4 and IW-6 through IW-17, and groundwater monitoring wells. Boreholes for injection wells IW-18 and IW-19 were drilled using a 10-inch hollow-stem augur. Existing monitoring well MW-40-27 was designated as IW-5 and was used as an injection well. The injection wells and the shallow-interval groundwater monitoring wells consist of a 4-inch-diameter schedule 40 polyvinyl chloride (PVC) 0.01-inch slotted screen interval from approximately 15 to 35 feet bgs and a 4-inch-diameter schedule 40 PVC blank well casing completing the well from 15 feet bgs to ground surface. A #2/16 sand (or equivalent) was used as well packing from approximately 6 inches below to 3 feet above the screen interval. A minimum 3-foot bentonite seal was placed above the sand interval to a depth of approximately 10 feet bgs. An approximately 10-foot-long nested soil gas probe consisting of a ½-inch-internal diameter PVC pipe was placed inside the upper 10 feet of each borehole and next to the 4-inch-diameter injection casing. The probes are perforated from approximately 3 feet to 10 feet bgs and placed in a sand pack. The top of the wells were sealed with hydrated bentonite chips from the top of the sand pack (2.5 feet bgs) to approximately 0.5 foot bgs. A ¼-inch lab valve was placed at the top of each probe and used as sampling port. IW-5 (pilot test well MW-40-27), IW-18, and IW-19 do not have soil gas probes installed in them.

Each well was covered with a traffic-rated, 12-inch-diameter, round, EMCO Wheaton vault made of cast iron steel cover and rims. The vaults were set in concrete. The top of the vaults were installed approximately 0.5 inch above ground surface (in the middle) and secured with concrete to the ground. A 12-inch concrete apron was constructed around each vault, with the concrete tapered down at the outer edges. The typical injection and groundwater monitoring well construction is presented in Figure 4-1, and relevant individual detailed information for each well is included in Table 3-1. A mark was placed on the casing of each well for consistent groundwater level measurements.

4.7.3 Well Development

The new injection and monitoring wells were developed to improve hydraulic conductivity between the wells and the surrounding formations. Well development began on March 10, following completion of the construction of all wells. Well development activities were completed on March 16, 2005. Well development consisted of surging during construction and then removing approximately three to five calculated well volumes of water from each well while noting changes in turbidity, pH, conductivity, and temperature. Development was performed using a well development rig capable of bailing, surging and pumping groundwater. Development water was placed in a 6,900-gallon Baker tank or in 55-gallon drums and was temporarily stored on site within a fenced staging area immediately to the north and adjacent to Building 239. Following profiling and characterization activities, the wastewater was hauled off site and disposed of in accordance with applicable state and federal laws. See additional details in Section 4.12.2.

4.7.4 Soil Vapor/Gas Monitoring Well Construction Details

Four soil vapor/gas monitoring wells were installed. The soil gas monitoring well design consisted of a 2-inch-diameter schedule 40 PVC 0.01-inch slotted screen interval from approximately 3 to 10 feet bgs and a 2-inch-diameter schedule 40 PVC blank well casing completing the well from 3 feet bgs to surface. The well casing was installed inside a 12-inch-diameter borehole drilled to a minimum depth of 10 feet bgs. The bottom and top of the well casings were fitted with 2-inch-diameter PVC pipe caps. A ½-inch PVC lab valve was installed at the center of the pipe cap at the top of the casing and was used as a monitoring port. A #2/16 sand (or equivalent) was used as well packing from approximately 6 inches below to 6 inches above the screen interval. A minimum 1-foot bentonite seal was placed above the sand interval and a grout seal (95 percent Portland cement and 5 percent bentonite gel) was used to complete each well to surface.

The wells were covered with 12-inch-diameter, round, EMCO Wheaton vaults made of cast iron cover and rim. The top of the vaults are installed approximately 0.5 inch above ground surface (in the middle) and secured with concrete to the ground. A 12-inch concrete apron is constructed around each vault, with the concrete tapered down at the outer edges. The typical soil vapor/gas monitoring well construction is presented in Figure 4-2, and relevant individual detailed information for each well is included in Table 3-1.

4.8 INSTALLATION OF DEDICATED GAS-OPERATED BLADDER PUMPS

Dedicated QED Well Wizard® Model P1101S gas-operated bladder pumps were installed in all the newly installed groundwater monitoring wells (MW-40-30 through -39) to facilitate low-flow purging and sampling of these wells during groundwater sampling. Implementation of low-flow purging and sampling is intended to provide representative groundwater quality samples while minimizing turbidity and the volume of water that must be removed from the well during purging.

Each pump was tested, cleaned, and laboratory-certified to be free of VOCs prior to shipment. All components necessary for each pump installation were shipped to the site as a well-specific package ready for assembly and installation.

Field team members responsible for installation of the bladder pumps received training from the vendor's technical representative prior to commencing the field activities.

Upon arrival at each well to be equipped with a dedicated bladder pump, an inspection of the well was conducted to assure that the surface seal, the outer steel protective casing, and the well lock were in good condition. No damage that required repairs to the wells was noted. The field team leader also verified that the correct pump system was being installed in each well. Clean plastic sheeting was then laid out on the ground adjacent to the well. All pump components to be installed in the well were laid out on this plastic sheeting to prevent contact with possible contaminants on the ground surface.

The pumping system consists of a PVC-bodied bladder pump equipped with a Teflon® bladder and an inlet screen, Teflon-lined polyethylene twin-bonded tubing (⅜- or ½-inch discharge line bonded to ¼-inch air line), and a 4-inch sealing well cap constructed with anodized aluminium. The bladder pumps were suspended from the top of the well using 3/16-inch stainless steel heavy duty cable attached to the bladder pump at the bottom and to the well cap at the top via stainless steel eyebolts.

All pumps were installed at a depth corresponding to the midpoint of the screened interval in each proposed groundwater monitoring well. Prior to installing the pump, the total depth of the well was measured to confirm that the casing was open and unobstructed. The measured total depth of the well was recorded in the field logbook. A measurement of the static water level was also made and recorded to confirm that the groundwater conditions were consistent with the well-specific pump installation design. The bladder pumps were placed down the well in mid-screen interval. Bladder pumps were installed in the shallow interval monitoring wells (screened from approximately 15 feet to 35 feet bgs) at a depth of approximately 25 feet bgs.

The air/discharge tubing and the water-level probe and tubing were attached to the well cap, and the pump was attached to the other end of the air/discharge tubing using fittings provided by the manufacturer specifically for this purpose. The assembled pump was then lowered slowly into the well to minimize mixing of the stagnant water column in the casing above the screened interval and to minimize disturbance of suspended sediment that may have accumulated at the bottom of the well.

During each sampling event and upon arriving at each well, the well vault was opened and monitored with a photoionization detector (PID) and explosive gas meter, and the water level was taken. The air compressor, pump controller, and flow-through cell were connected to the discharge line coming from the dedicated pump. Purge flow rate was set between 200 and 500 milliliters per minute (mL/min), and water level drawdown was monitored to be less than 0.3 feet. Using the flow-through cell, pH, specific conductivity, temperature, ORP, and DO were monitored to stabilization. The flow-through cell was removed and, after changing gloves, groundwater samples were collected at the appropriate flow rates.

If required, the flow rate was set at 200 mL/min and the hydrogen stripping cell was attached to the discharge line. After filling with water, 20 mL of air was injected into the cell using a syringe and allowed to strip for 20 minutes. A total of 15 mL was removed using a syringe and injected into the appropriate sample vials.

4.9 INSTALLATION OF REAGENT INJECTION AND DELIVERY SYSTEM

The sodium lactate injection system elements include the proportional mixing and injector system, the well packer assembly, and the sodium lactate. Below is a description of the above three elements.

4.9.1 Proportional Injector System and Installation

The Dosatron International product injector, Model DI210, was used to mix the concentrated sodium lactate (delivered at 60 percent concentration) with water and inject a solution with approximately 3 percent concentration into the aquifer. This Dosatron is a non-electric proportional injector that uses water pressure as a power source. The water activates the dispenser, which takes up the required percentage of lactate concentrate directly from the solution container. Inside the dispenser, the concentrate is mixed with the water, and then the water pressure transports the mixture to the injection well. The injector system consists of a digital flow meter, a pressure regulator, an 80 micron/200 mesh water filter on the inlet side, ball valves, liquid dispenser, a water meter, and a check valve on the outlet side. A schematic diagram of the Dosatron International product injector and injection system manifold is presented in Figure 4-3.

This Dosatron injector can handle a flow of up to 11 gpm and a pressure ranging from 7 to 57 pounds per square inch (psi). It can mix solutions at a ratio from 1:50 to 1:10. Since the lactate solution is available from the manufacturer at a concentration of 60 percent; a mixing ratio of 1:20

was used to produce the desired 3 percent concentration. The apparatus was assembled and attached on a 2-foot-wide by 3-foot-long wooden board mounted on a portable cart and was moved to the desired injection well locations throughout the site. The carts are designed with pneumatic tires for easy hauling on rough surfaces. An existing fire hydrant located near the south side of the site and two tap water hose bibs located outside Building 240 were used as sources of water for the injection system. Each injector cart was connected to the nearest tap water source or the fire hydrant via ¾-inch hoses. A backflow preventor was installed at the fire hydrant.

A process and instrumentation diagram is included as Figure 4-4.

4.9.2 Injection Well Packer Equipment and Installation

A 4-inch-diameter inflatable well packer was set in each injection well casing to seal the well from the atmosphere and control hydraulic head in the well during lactate injection. The packers were constructed with stainless steel and neoprene. The packers were manufactured by QED. The packers were placed between the water table and the top of the well screen at approximately 13 feet bgs. At each location, lactate was fed through the packer and injected into the aquifer near the top of the well screen interval (approximately 14.5 feet bgs) and below the water table. The packers consist of two tubing connections with compression fittings – a ¼-inch connection to accommodate nitrogen used for packer inflation and a ½-inch pass-through connection for lactate injection. The packer was connected to a well cap a 3/16-inch stainless steel heavy-duty support cable. Two polyethylene tubings (¼-inch for air supply and ½-inch for lactate delivery) were attached to the packer and to the 4-inch-diameter well caps at the top of the well casing. The ¼-inch polyethylene tubing attached to the well caps for air supply were equipped with a quick disconnect fitting for nitrogen.

4.9.3 Biostimulation Reagent Material

Sodium lactate was procured from JRW Bioremediation LLC, located in Lenexa, Kansas. The product was manufactured under the trade name of Wilclear by Archer Daniels Midland Company at their plant located in Decatur, Illinois. Wilclear is a medical grade and an aqueous form of sodium lactate at a concentration of 60 percent. Wilclear was delivered in 260-gallon capacity (approximately 2,850 pounds) totes to the site, and on an as-needed basis.

When delivered to the site, a forklift was used to move the totes near the injection wells. Two or three totes were placed next to each of the injection wells and the remaining totes were placed inside a fenced secondary containment area. Sodium lactate was injected into each wells via the injection system as described in Section 4.9.1. The suction tubing attached to the suction end of the Dosatron was placed inside the totes. The outlet of the injection system was connected to injection well packer via tubing, hose, and proper fittings.

4.10 DHC REDISTRIBUTION SYSTEM

To facilitate DHC distribution, initial bioaugmentation activities included pumping existing DHC-laden groundwater from IW-5 (formerly MW-40-27) to other injection wells throughout the array. MW-40-27 was used during the pilot test and had been subject to periodic lactate injections to facilitate growth/maintenance of the KB-1 culture, which had migrated to this well following bioaugmentation during the pilot study. The groundwater was redistributed using a Grundfos Redi-Flo2 submersible pump, tubing, and flexible hose, attached to the Dosatron injection system. Power from Building 240 was used to power the submersible pump. Results of the transfer of DHC-laden water are discussed in Section 4.11.13.

4.11 EISB IMPLEMENTATION AND MONITORING ACTIVITIES

The following subsections contain summaries of activities that were conducted in implementation and monitoring of the EISB system during the first 6 months, including adjustments that were made during the course of operation. Performance monitoring results are presented subsequently in Section 5.0, and a summary of findings and recommendations are provided in Section 6.0.

Ten monitoring wells (MW-40-30 through MW-40-39), 18 injection wells, and four soil vapor/gas monitoring wells were installed at IRP Site 40 for the EISB process. As described in Section 4.7, QED Well Wizard gas-operated bladder pumps were installed in the monitoring wells constructed as part of the EISB for low-flow purging and sample collection. The DON had previously installed 29 monitoring wells during the prior investigative and pilot test phases. Fourteen of the previously installed groundwater monitoring wells (MW-40-01, -02, -06, -07, -08, -10, -11, -13, -14, -15, -17, -19, -20, and -22) were used along with the 10 newly installed groundwater monitoring wells (MW-40-30 through MW-40-39) for monitoring. The previously constructed monitoring wells (by other DON consultants) contained dedicated QED gas-operated bladder pumps for sampling purposes. Only monitoring wells (MW-40-02, -07, -14, -22 and MW-40-30 through MW-40-39) were selected for performance monitoring during the EISB phase, since these wells are located within the active treatment areas. The remaining monitoring wells were sampled and monitored on a quarterly basis.

During the course of the EISB implementation, several of the injection wells were also sampled. The injection wells included IW-6, -7, -8, 9, -12, -13, 14, -17, -18, and -19. A peristaltic pump was used for sampling groundwater in the injection wells, as installing dedicated bladder pumps are not feasible for the injection wells, which are fitted with injection well packers. Table 3-1 includes a list of all the wells (injection, groundwater monitoring and soil vapor/gas monitoring) installed at the site along with screen depths and additional construction details, and Figure 1-3 shows the location of the wells.

During performance monitoring, groundwater parameters were analyzed using both field test methods and laboratory analyses. Table 4-1 includes the list of analytical parameters and the sampling frequency for each parameter. Groundwater sampling and analysis included:

1. **Baseline analysis.** Prior to initiation of the EISB process, field test kits were used to measure nitrate (NO_3^-), sulfate (SO_4^{2-}), ferrous iron [Fe(II)], carbon dioxide (CO_2), alkalinity, and chemical oxygen demand (COD) in the monitoring wells to establish baseline concentrations. A flow-through cell equipped with multiple monitoring probes were used to collect pH, temperature, conductivity, ORP, and DO readings. In addition groundwater samples were collected for laboratory analysis. Details of the baseline monitoring event are provided in Table 4-2.
2. **Biweekly field testing.** Biweekly field testing was conducted during the initial 6 months, including during the active remediation (lactate injection) period. Field testing included testing for NO^{3-}, SO_4^{2-}, Fe(II), CO_2, alkalinity, COD, pH, temperature, conductivity, ORP, and DO.
3. **Monthly monitoring**. This consisted of field testing and collecting samples from monitoring wells for laboratory analysis. Laboratory analyses consisted of the parameters listed in Table 4-1. In addition, DO, pH, ORP, conductivity, and temperature measurements were recorded at each well using a flow-through cell field instrument at the time of sampling. Sampling and analytical procedures are discussed in Section 4.11.2.
4. **Additional Monitoring and Testing.** Some additional testing of the injection wells and monitoring wells were also performed on an as-needed basis, for various parameters, and in several cases, to investigate several aspects of the system. During the lactate injection period, groundwater samples were collected from select monitoring wells for field testing of COD to assess migration of lactate. In addition, water levels were also measured during this time. COD and water levels were collected more frequently at the beginning of the EISB. Details of the additional monitoring are included in Tables 4-2, 4-3, and 4-4.

4.11.1 Field Testing Procedures

Field test kits and a flow-through cell were used to collect field parameters. Groundwater was collected by first purging 1 to 2 tubing volumes and then collecting a sample for the COD field test kit.

Field test kits were used for the following parameters:

- NO^{3-}
- SO_4^{2}
- Fe(II)
- CO_2
- COD

The following parameters were collected using direct reading instruments in the field:

- pH, temperature, conductivity, ORP, and DO by flow-through cell
- Methane, oxygen, CO_2, hydrogen sulfide, total explosive gas by multisensor gas meter

4.11.2 Groundwater Sampling Procedures

The following steps summarize the procedures for measuring water level, purging wells, determining when water-quality parameters have stabilized, and collecting samples using the low-flow groundwater sampling technique.

All field activities were conducted in accordance with the worker health and safety provisions provided in the site-specific health and safety plan requirements described in the Work Plan (TtEC, 2005). The wellheads were monitored for organic vapors and explosive gases with a calibrated PID and an explosive gas meter. Methane gas was detected in some of the monitoring wellheads and inside the vaults. However, after opening and removing the vault covers, the area was ventilated and the gasses were allowed to escape into the open air. No gasses were detected within the vault and the air space surrounding the work area following the ventilation and while sampling. When the well caps were initially removed, the top of the well casing was monitored for organic vapors. A multisensor gas meter was used to screen for the presence of flammable vapors, carbon monoxide, hydrogen sulfide, and oxygen-deficient and oxygen-enriched atmospheres during field activities. Flammable vapors (for example methane gas) were not detected at concentrations greater than 10 percent of lower explosive limit (LEL) in the area where testing was conducted. A flame ionization detector (FID) was also used to determine the presence and concentration of organic vapor. VOCs were not detected in the breathing zone.

A calibrated QED MicroPurge flow-through cell was used to monitor field parameters such as pH, temperature, conductivity, ORP, and DO. Water level and field parameters were recorded every 3 to 5 minutes on the groundwater sampling data sheet.

A pump controller was used to connect to a compressed air source and to the air line fitting on the well cap. One end of discharge tube on the pump was connected to the discharge line on the well cap and the other end was connected to the inlet of QED MicroPurge flow-through cell. The flow rate was adjusted to 100 to 500 mL/min once the pump controller was turned on to start purging the well. A flow rate of approximately 200 mL/min was maintained prior to filling volatile organic analysis (VOA) containers. The sampling rates were recorded on the groundwater sampling data sheets.

4.11.3 Analytical Methods

The following EPA analytical methods, *Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846*, Third Edition and final updates (EPA, 1986); *Compendium of*

Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition and final updates (EPA, 1999a); *Standard Practice for Analysis of Reformed Gas by Gas Chromatography* [American Society of Testing and Materials (ASTM), 2000)], were used to analyze samples during this project:

Water Samples

The following methods were used for laboratory analysis of groundwater samples collected and analyzed during the EISB performance monitoring:

- VOCs by EPA Method 8260B
- Dissolved gases (methane, ethane, ethene, CO_2) by RSK 175M
- Dissolved hydrogen sulfide by EPA Method 16-M
- Dissolved hydrogen by Microseeps Method AM20GAX
- TDS by EPA Method 160.1
- Major anions (sulfate, chloride, NO^{3-}, nitrite) by EPA Method 300.0
- Major cations (calcium, iron, magnesium, potassium, sodium) by EPA Method 6010B
- Alkalinity by EPA Method 310.1
- COD by EPA Method 410.4
- Deoxyribonucleic acid (DNA) testing by method quantitative polymerase chain reaction (Q-PCR)
- Volatile fatty acids by gas chromatograph (GC)/FID
- Phospholipid fatty acids (PLFA) by White, 1979
- TOC by EPA Method 9060

Vapor Samples

- VOCs by Modified EPA Method Toxic Organics (TO)-15
- Fixed gases by ASTM D 1946

4.11.4 Data Quality Assessment

Field QC samples were collected and analyzed during the project to assess the consistency and performance of the sampling program. Field QC samples included field duplicates and trip blanks.

4.11.4.1 Field Duplicates

Field duplicates consist of two distinct samples (an original and a duplicate) of the same matrix collected at the same time and location to the extent possible and using the same sampling techniques. The purpose of field duplicates is to measure the consistency of field sampling. Field duplicates were collected at a frequency of one for every ten samples taken and were analyzed for the same analytes as the original sample. Field duplicates are uniquely identified so that the identity of the field duplicates is "blind" to the analytical laboratory. Exact locations of field duplicate samples and their identifications were recorded in the field logbook.

4.11.4.2 Trip Blanks

Trip blanks were collected for QC. Trip blanks are hydrochloric acid-preserved, analyte-free, deionized water prepared by the laboratory in 40-mL VOA vials that were carried to the field, stored with the samples, and returned to the laboratory for VOC analysis. Trip blanks were used to determine if samples have been cross-contaminated with VOCs during sample transportation to the laboratory. One trip blank was provided in each cooler, which contained samples for VOC analysis. Trip blanks were prepared using the same type of containers, analyte-free, deionized water, and preservatives as the field samples.

Trip blanks were generally free of contamination. Few trip blanks contained trace amounts of acetone, and methylene chloride, which are considered common laboratory contaminants.

Toluene and xylenes were reported in six trip blanks out of 33 trip blanks. Reported concentration of toluene and xylenes in the trip blanks are as follows:

Date of Trip Blank	Toluene (μg/L)	Xylenes (μg/L)
6/27/05	25	0.36
7/1/05	2.3	Not detected
7/5/05	0.42 J	Not detected
7/6/05	1.3	Not detected
7/26/05	2	Not detected
9/26/05	0.39J	Not detected

Based on review of the data by TtEC and laboratory manager, the concentration of toluene of 25 μg/L was confirmed in the trip blank used on June 27, 2005. It is a common practice of the laboratory to reanalyze trip blank samples in the second vial when the first vial is detected with analytes. The second vial of the trip blank from June 27, 2005, was analyzed and toluene was detected at a concentration of 30 μg/L. A laboratory QC check of trip blank preparation indicates that toluene and xylene were not present in prepared trip blank vials prior to sending to contractors. In addition, trip blanks sent back from other contractors from the same batch did not find any toluene or xylenes. Therefore, concentrations of toluene and xylenes detected in trip blanks are not laboratory anomaly. Based on the record kept by the laboratory, the last shipment prior to June 27, 2005, was on May 20, 2005. The trip blank had been stored in the TtEC storage container for 5 weeks.

As stated above, toluene was detected at concentration of 25 μg/L in the trip blanks used on June 27, 2005. Samples associated with the trip blank were collected from MW-40-10, 06, 22, 14 and 33. Toluene was detected only in MW-40-14 at a concentration of 3.9 μg/L.

Toluene was reported from samples collected (July 1, 2005) from MW-40-20 and -31 at concentrations of 0.42 and 0.68 μg/L, respectively. MW-40-20 was sampled in March, July and September, and toluene was reported in a sample collected in September at a concentration of 0.98 μg/L and 1 μg/L in the field duplicate sample. Samples from MW-40-31 were collected monthly and found toluene in every sampling event since May 2005. Therefore, the data for both MW-40-20 and 31 are valid and usable.

Samples collected on July 5, 2005, are from injection wells IW-13, IW-14, IW-17, IW-8, and IW-9. Reported concentrations of toluene from the above wells are 1, 46, 35, 20 and 10 μg/L, respectively. The toluene concentration reported in the associated trip blank is 0.42 μg/L. Since concentrations in the well samples, with the exception of IW-13, are above 10 times the concentration found in the trip blank, the results are considered valid and usable.

For July 7, 2005, toluene reported in samples from IW-12, IW-6 and IW-7 are 21, 3.8 and 1.3 μg/L, respectively. The toluene concentration reported in the trip blank associated with the above samples is 1.3 μg/L. Since the result for IW-6 is well above 10 times the concentration found in the trip blank, the data for IW-6 are valid and usable.

For the sampling date of July 26 and September 26, 2005, toluene concentrations reported in trip blanks are 2 and 0.39 μg/L, respectively. Only samples collected from MW-40-14 on both dates were detected with toluene at concentrations of 1.7 and 3.1 μg/L respectively.

The purpose of the trip blank is to monitor cross-contamination between samples during sample collection and shipping to the laboratory. It is possible that trip blanks were cross-contaminated due to concentrations of toluene found in the injection wells collected on July 5 and 7, 2005. However, cross-contamination of toluene is not possible for samples collected during the July 26 and September 26 events because samples collected from other wells on both days did not have toluene, and toluene concentrations reported in both samples from MW-40-14 are considered low level. In addition, toluene has been reported in every monthly sample collected from MW-40-14 since May 2005. Therefore, contamination found in trip blanks most likely occurred from being stored in the storage container on site and not from cross-contamination of samples. Therefore, toluene concentrations found in all samples are valid and usable.

4.11.5 Data Validation

All chemical sample data were validated by an independent data validation company except for waste characterization samples. Data were validated at 90 percent EPA Level III and 10 percent EPA Level IV. The validations were in accordance with the Contract Laboratory Program

National Functional Guidelines for Organic Data Review, EPA 540/R-99/008 (EPA, 1999b), Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review, EPA 540/R-94/013* (EPA, 2004), *Environmental Work Instruction (EWI) #1, 3EN2.1, Chemical Data Validation* (Southwest Division, Naval Facilities Engineering Command, 2001), and the QC criteria specified in the referenced methods and in the Work Plan (TtEC, 2005). Data not meeting method and/or Work Plan (TtEC, 2005) specifications were flagged as estimated ("J") or rejected ("R").

One hundred percent of all data sets were reviewed by an independent peer analyst. Peer reviews were performed by an analyst that is qualified to perform the subject analytical method. The peer review was comprehensive and included the following:

- Checked 100 percent of manual entries for transcription errors
- Checked 100 percent of manual calculations for accuracy
- Spot-checked computer calculations to verify program validity
- Checked for compliance with method- and project-specific QC requirements
- Checked for completeness of raw data or supporting materials
- Confirmed spectral assignments
- Checked descriptions of deviations from method or project requirements
- Checked for appropriate use of significant figures and rounding
- Checked reported values for dilutions
- Evaluated reasonableness of results

4.11.6 Baseline Sampling and Analysis

Following well installation and prior to sodium lactate injection, baseline sampling was conducted during the period from March 21 to March 25, 2005. Baseline sampling and monitoring included water level measurements, field testing and collecting groundwater samples for laboratory analysis. Baseline soil vapor/gas sampling was conducted on March 28, 2005. Groundwater samples were collected from 10 newly installed (MW-40-30 through MW-40-39) and 14 previously installed monitoring wells (MW-40-01, -02, -06, -07, -08, -10, -11, -13, -14, -15, -17, -19, -20, and -22). Theses wells were tested in the field for the field testing parameters. The details of the baseline sampling event and field testing are summarized in Table 4-2.

Table 4-2 provides a list of parameters that were analyzed during the baseline event, which included analysis for chemical and biological parameters including VOCs, dissolved gases, TDS, major anions and cations, alkalinity, COD, DNA, volatile fatty acids (VFA), PLFA, and TOC. The baseline field testing and laboratory analysis provided information regarding the status of the groundwater prior to implementing EISB activities and to establish baseline concentrations, against which subsequent measurements could be compared and assessed.

4.11.7 Sodium Lactate Injection, Round 1

An initial round of lactate injection activities commenced on March 28, 2005, and was concluded on Friday, May 27. The injections wa conducted by groups of well as follows (refer to Figure 1-3 and Table 4-3):

- Group No. 1: IW-1, IW-4, IW-5, IW-7, IW-15, IW-16, and IW-18
- Group No. 2: IW-2, IW-6, IW-8, IW-10, IW-11, and IW- 13
- Group No. 3: IW-3, IW-9, IW-12, IW-14, and IW- 17

Approximately 472,000 gallons of water mixed with approximately 21,600 gallons of 60 percent sodium lactate (3 percent lactate solution) were delivered over 9 weekly cycles to 17 injection wells. Total daily and cumulative injection volumes are shown in Figure 4-5. Daily and cumulative sodium lactate injection volumes at each well are included in Figures B-1 through B-5 in Appendix B. The target dosing rate for all wells was 4 gpm, based on the rates achieved in a single well used during the pilot test. It was expected, however, that some variability would be encountered in injecting into multiple points. Data presented in Appendix B show that injection rates were reasonably consistent with the target rate, but for a few of the wells, were slightly less than the target rate, varying from 1.5 gpm to 4.6 gpm due to low-flow and low-pressure rates at the tap-water sources. However, the daily injection durations were slightly extended as required to maintain the desired daily dosing amounts.

The only anomaly observed during the initial lactate injection activities involved lactate solution rising to the surface in the vicinity of IW-15. Infiltration of lactate solution into the formation at this location appears to have been inhibited, and the solution migrated vertically and then laterally beneath the asphalt pavement, surfacing along cracks in the asphalt. When surface extrusion of lactate solution was observed, dosing was temporarily stopped at this location. However, after reassessing the conditions in this area, the injection was resumed, albeit at a reduced rate of approximately 1.8 gpm, which resulted in stoppage of the sodium lactate extrusion through the ground. While this injection rate is less than the 4 gpm that was initially intended, this rate would still result in a significant volume of lactate introduced in this area.

4.11.8 Groundwater Level Measurements

In addition to samples being collected and analyzed for chemical parameters, groundwater levels were monitored to assess mounding and flow patterns. Initially during the first month of lactate injection, groundwater level measurements were conducted weekly in all newly installed monitoring wells, selected existing shallow interval monitoring wells, and all injection wells, to assess mounding effects. Afterwards groundwater level measurements were conducted on a monthly basis. Groundwater level measurements were conducted using a Solinst water level meter. Water level was measured from the top of the casing to the top of the water to nearest 0.01 feet. All measurements were recorded in the field on appropriate forms.

4.11.9 Soil Gas Monitoring

This section describes soil gas monitoring and sampling procedures. Soil gas monitoring consisted of 1) field testing of the soil gas monitoring probes, 2) surface emissions monitoring and 3) soil vapor gas sampling and analysis. Following the baseline monitoring and sampling event, soil vapor/gas monitoring and surface emissions monitoring were conducted on a monthly basis, and generally at the end of each month. In addition, soil vapor samples were also collected on a monthly basis for laboratory analysis of VOCs and fixed gasses in soil vapor samples. Prior to their use in the field, all sampling and testing instruments were calibrated according to the manufacturer's instructions using instrument-specific calibration gasses. The following subsections discuss the field testing and sampling procedures.

4.11.9.1 Field Testing of the Gas Monitoring Wells and Nested Probes

Soil gas monitoring was conducted to evaluate the presence of methane and hydrogen sulfide gas in the vadose zone, and to monitor migration of the subsurface gasses toward the nearby buildings. Methane is a flammable gas that poses a potential explosion hazard and is asphyxiating. Hydrogen sulfide gas is toxic and could become a safety hazard. VC is a human carcinogen. Field testing and monitoring of soil vapor/gas was conducted in all soil vapor/gas monitoring probes (VW-01 through -06) and all 24 nested probes (constructed with ½-inch-diameter PVC, as described in Section 4.7.4) installed next to the 4-inch well casings in each of the 16 injection wells (IW-1 through -4, and IW-6 through -17), and monitoring wells MW-40-30 though -39.

Monitoring of the soil gas/vapor wells and probes included field measurement for methane, hydrogen sulfide, oxygen, CO_2, carbon monoxide, and VOC concentrations. An explosive gas meter (Landtec Model GEM 500) was used for measuring methane gas, CO_2, and oxygen concentrations in percent in air volume. In addition, a MSA Orion quad-gas-meter was used to detect methane concentrations in percent LEL, and hydrogen sulfide concentrations in parts per million by volume (ppmv). A PID instrument was used to detect VOC concentrations in parts per million (ppm). The instruments were equipped with pumps to allow samples to be drawn through a tube connected to the well sampling port. Field logs were used to record the time of monitoring, and the gas concentrations detected by the instruments used. The results of the soil gas monitoring and testing are discussed in detail in Section 5.2.

4.11.9.2 Soil Vapor/Gas Sampling and Analysis

Air samples were collected from soil gas monitoring wells (VW-40-01 through VW-40-06) and nested probes in wells IW-1, IW-3, IW-7, MW-40-31 and MW-40-34 for laboratory analysis. The samples were collected in Tedlar™ bags using an oil-less vacuum/pressure pump. Approximately 6 liters of gas were purged from the wells before sampling. The samples were shipped to Environmental Analytical Services, Inc. laboratories located in San Luis Obispo, California, for analysis. Tedlar™ bag samples were subjected to VOC analysis using EPA

Method TO-15 full-scan GC/mass spectrometer analysis, and for fix-gas analysis using ASTM 1946 GC/thermal conductivity detector analytical method. Fixed gasses included methane, CO_2, ethene, and ethane. The results of the soil gas sampling and analysis are discussed in detail in Section 5.2.

4.11.9.3 Surface Emissions Monitoring

Methane gas emission was measured and in and around Buildings 240 and 239. Particular attention was given to areas where methane gas could migrate into the building through cracks, utility penetrations, or other pathways in the floor slab. Measurements were also taken outside the buildings, in the work zones, at the EISB system area boundary, at cracks in the asphalt pavement, and at the sewer or other utility manhole covers near the injection areas. An explosive gas meter (Landtec Model GEM 500, or equivalent) was used for measuring methane gas concentrations in percent in air volume. The probe was placed at the crack or about an inch above the crack or the surfaces being monitored. The probe was held for at least 2 minutes or until the instrument showed steady readings. A site map was used to record the field measurements. Surface emissions monitoring results are discussed in detail in Section 5.3.

4.11.10 Installation of Temporary Wells Downgradient of Well MW-40-07

Laboratory analysis results for baseline samples collected from downgradient groundwater monitoring well MW-40-07 indicated a PCE concentration of 48 μg/L. Since this well is significantly downgradient of the injection well network, an investigation was conducted to determine the extent of VOCs downgradient of MW-40-07, and to determine whether the COCs have migrated beyond the original plume boundaries in this area. The investigation consisted of installing five temporary shallow groundwater monitoring wells downgradient of MW-40-07. These five wells were installed in the area between MW-40-07 and MW-40-39, which is the furthest most southeasterly downgradient monitoring well. The wells were installed using direct push method. Prosonic Corporation located in Signal Hill, California, was subcontracted by TtEC to install the wells. Prosonic Corporation mobilized at the site on June 6, 2005, and installed all five wells on that day. The wells were designated as HP-1 through HP-5. Wells HP-1, HP-2, and HP-3 were installed at a distance of approximately 50 feet downgradient from MW-40-07, and wells HP-4 and HP-5 were installed at a distance of approximately 75 feet downgradient from MW-40-07. A 2½-inch internal diameter steel casing with a conical plug attached to the bottom end was used to penetrate the soil formation, using a Geoprobe 6610 direct push rig. The geoprobe was driven into the soil formation until high soil resistance was encountered that prevented the geoprobe to advance any deeper. The wells consist of a 2-inch-diameter schedule 40 PVC 0.01-inch slotted screen interval of approximately 10 to 15 feet long and a 2-inch-diameter schedule 40 PVC blank well casing completing the well from the top of the screen to ground surface. Each well was covered with a traffic rated, 8-inch-diameter, round, EMCO Wheaton vault. The vaults were set in concrete. The top of the vaults are installed approximately 0.5 inch above ground surface (in the middle) and secured with concrete to the ground. A 12-inch concrete apron is constructed around each vault, with the concrete tapered down at the outer edges. The locations of these wells are shown on Figure 1-3. On June 8, 2005, following installation of these wells, groundwater samples were collected for VOCs and general chemistry analysis. Laboratory analysis results indicated non-detect concentrations for the COCs.

4.11.11 Redistribution of DHC-laden Groundwater to Injection Wells

From the end of the pilot test to the beginning of the full-scale project, BEI had been administering periodic lactate injections into well MW-40-27 (injection well IW-05), which had previously received injections of the KB-1 bioaugmentation culture (containing DHC) during the pilot study. This was done to maintain cell concentrations and viability for possible use in bioaugmenting during the full-scale project. COD and DHC were assessed in groundwater samples from IW-5 during the prior month, and the cell concentration in the sample was 2.04E+08 cells/liter (L), and the COD was greater than 9,000 mg/L. Accordingly, the DHC-laden groundwater from IW-05 was redistributed into the new injection wells. Approximately 4 gpm were pumped from IW-05 and distributed evenly into two injection wells per day. This resulted in 2 gpm per well and about 800 gallons of redistributed water per well. Water from IW-5 was pumped into several of the wells closer to monitoring wells with higher COC concentrations twice. Redistribution of the DHC-laden groundwater was completed on May 26. Approximately 18,000 gallons of water were pumped from IW-5. The water was mixed with 3 percent sodium lactate before injection into the injection wells. Subsequent analysis was conducted during the next month to determine the success of the DHC redistribution efforts.

4.11.12 Sodium Lactate Injection, Round 2

A second round of lactate injections commenced on August 1, 2005. Lactate was injected into the existing injection wells (IW-1 through IW-16) and into an additional well, IW-18, which was installed in the general vicinity of monitoring well MW-40-07 (refer to Figure 1-3). Injections were conducted 3 days per week, and each well was injected 1 day per week at 4 gpm for 8 hours. A total of approximately 1,900 gallons of 3 percent sodium lactate solution was injected into each well per day, and the total volume injected was 217,000 gallons. Lactate injections continued until October 11, 2005. Total daily and cumulative injection volumes are included in Figure 4-5; daily and cumulative injection volumes at each well are shown in Appendix B.

During and following Round 2 lactate injection activities, groundwater soil gas parameters were analyzed as summarized in Table 4-4.

4.11.13 Monitoring DHC Concentrations in Injection Wells

As noted in Section 4.11.11, DHC-laden water was transferred from IW-5 (MW-40-27) to all injection wells during the period from May 16, through May 27, 2005. DHC concentrations were measured via Q-PCR in IW-6, IW-7, IW-8, IW-9, IW-12, IW-13, IW-14, and IW-17 approximately 5 weeks following the transfer on July 5, 2005. On August 30, 2005, IW-6, IW-8, and IW-13 were sampled again and tested for DHC, in order to assess transfer and survival/growth of the transferred organisms. Results indicate that DHC counts did not increase.

4.11.14 Bioaugmentation With KB-1 Culture

Following the Round 2 injection, it became apparent that: 1) reductive dechlorination of PCE and TCE to DCE continues to occur to varying degrees, 2) key geochemical data suggest that the site is substantially reduced, and 3) clear evidence of reduction beyond DCE has not been obtained (refer to Section 5.1). Therefore, the decision was made to proceed with bioaugmentation, as specified in the Work Plan (TtEC, 2005).

SiREM (sub-consultant to TtEC) performed the bioaugmentation with the KB-1 during the week of September 19. A total of 10 injection wells were bioaugmented. Injection wells IW-9 and IW-13 were injected with approximately 21 L of the KB-1 culture on September 19, and the remaining eight wells, including IW-3, -6, -8, -9, -10, -12, -14, and -15, received inoculum on September 21, 2005. Approximately 18.5 L of the KB-1 were injected in each of the above eight wells, with the exception of IW-15, which received approximately 12.5 L of the KB-1 culture. During the 2 weeks following the injection of the KB-1 culture, none of the inoculated wells were stimulated with sodium lactate. However, sodium lactate injection continued in the remaining injection wells during that period. Injection of sodium lactate in the bioaugmented wells resumed on October 5, 2005, at a rate of 4 gpm, 8 hours per day and once a week.

Because the inoculum was injected so recently, no performance data are available for this report, and the success of the bioaugmentation will be addressed in subsequent reports.

4.12 WASTE CHARACTERIZATION AND DISPOSAL

There were several waste streams that resulted from IRP Site 40 remedial activities. These waste streams included 1) soil generated during drilling activities, 2) wastewater generated from well development and purging, and 3) wastewater generated from equipment decontamination. Wastes were stored in appropriate containers. This subsection describes the sampling, analysis, characterization, and disposal methods for the waste streams generated at the site.

4.12.1 Solid Waste Sampling, Analysis and Disposal

A total of five roll-off bins (20-cubic-yard capacity and closed-top) supplied by Denbeste Transportation, Inc., were used for containerization, storage, and transportation of the drill cutting and other solid waste material generated from the drilling activities. The roll-off bins were stored on site in a fenced temporary laydown area until final waste classification was made for disposal. The bottom and side-walls of the roll-off bins were lined with 10-mil-thick PVC liner and the tops of the roll-off bins had steel tops for cover. Approximately 62 tons of solid waste were generated from well drilling and construction activities.

Clean disposable plastic scoops were used to collect soil samples in pre-cleaned glass jars. Four discrete soil samples were collected in 8-ounce, pre-cleaned glass jars at random locations and depths from the drill cutting material in each of the five roll-off bins. The four samples from each bin were sent to the EMAX Laboratories. Composite samples were generated in the laboratory from the four samples for homogenization and analysis. A total of five composite samples (one for each roll-off bin and not including one QC sample) were analyzed for total VOCs by EPA Method 8260B, SVOCs by EPA Method 8270C, and Title 22 metals by EPA Method 6010B/7000.

Based on the laboratory analysis results the drill-cuttings were classified as non-hazardous waste and hauled off site for disposal.

Denbeste Transportation, Inc. hauled the roll-off-bins containing the drill cuttings and the solid waste to the Chemical Waste Management, Inc. disposal facility in Kettleman City, California, for disposal. This facility is a CERCLA-approved and -permitted disposal facility.

Non-hazardous waste manifests were completed for each loaded roll-off bin and submitted to the DON for signature. Original copies of the manifests were provided to the transporter for shipment.

4.12.2 Wastewater Sampling, Analysis and Disposal

Wastewater generated from well development and purging activities was placed in 55-gallon steel drums, and afterward, pumped into a 6,500-gallon capacity Baker tank installed at the site. The Baker tank was placed inside a secondary containment for containment of any accidental spills. The drums were placed in a lined containment area that was built over a concrete pad. The containment area was covered with a 20-mil polyethylene liner and bermed with sandbags for spill containment. A sample of the wastewater stored in the Baker tank was collected and analyzed for VOCs by EPA Method 8260B, SVOCs by EPA Method 8270C, and Title 22 metals by EPA Method 6010B/7000. Liquid samples were collected using disposable bailers. Samples were transferred from the bailers to pre-preserved, pre-cleaned sample containers using a bottom-emptying device. Based on sampling results, the wastewater were classified as non-hazardous waste. Approximately 4,400 gallons of non-hazardous wastewater were generated and hauled off site for disposal. Wastewater was hauled off site on May 10, 2005, by Denbeste Transportation Inc. of Windsor, California, and disposed of at the D/K Environmental recycling facility located in Vernon, California.

All waste material generated at IRP Site 40 was disposed of at a CERCLA-approved waste disposal facility. The use of the disposal facility was subject to approval under TtEC Subcontractor Qualification Procedures.

4.13 SUMMARY OF WORK PLAN MODIFICATIONS

In general, the project was operated in accordance with procedures put forth in the Work Plan (TtEC, 2005). The only major modification consisted of investigating VOC migration into MW-40-07. At present, VOC levels are relatively stable in this well, with PCE being the only contaminant present above its MCL at concentrations ranging from 48 µg/L (baseline result) to 100 µg/L (September 28, 2005). To address this situation, additional injection wells IW-18 and IW-19 were installed to supply additional lactate to this area. Finally, PCE has been detected at levels below the reporting limit (J-qualified) in MW-40-39, which is further downgradient of MW-40-07 (approximately 107 feet away). VOC concentrations in this area are being closely monitored, including periodic collection of groundwater samples from temporary monitoring wells HP-1, HP-2, HP-3 to determine whether additional remedial action may be required.

4.14 PHOTOGRAPHIC LOG

Photographs of the well drilling, installation, and development activities, equipment decontamination, substrate injection activities, and field monitoring and sampling activities were obtained during the implementation of the remedial activities. The photographs are presented in Appendix C.

5.0 EISB PERFORMANCE MONITORING RESULTS AND EVALUATION

This section presents the field testing and laboratory analytical results for groundwater, soil gas, and air monitoring that are evaluated in terms of preliminary performance of the system (essentially, conditioning of the aquifer for bioaugmentation). This section also presents groundwater monitoring results from March 2005 through September 2005. The discussions herein are focused on monitoring wells MW-40-02, -14, -22, and -30 through -39, as these wells are deemed to provide meaningful data regarding subsurface activity. Only data that exhibited meaningful trends are presented and discussed herein. A master table showing all analytical results is included on CD-R attached as Appendix D, and laboratory reports and raw field data are included as Appendix E. Graphic illustrations of the trends for these data are included in Appendix F.

5.1 DECHLORINATION/GENERAL PERFORMANCE ASSESSMENT

The major mechanism for biodegradation of CVOCs is reductive dechlorination, whereby CVOCs serve as terminal electron acceptors during anaerobic respiration (in the presence of a suitable substrate). In this process, chlorine (Cl) atoms are removed from the respective parent compounds, forming less chlorinated metabolites and the chloride ion (Cl^-). The generalized pathway for destruction of CVOCs can be represented as follows:

$$PCE \Rightarrow TCE+Cl^- \Rightarrow DCE+Cl^- \Rightarrow VC+Cl^- \Rightarrow \text{ethene} \Rightarrow \text{ethane} \Rightarrow CO_2 \text{ and } H_2O$$

Ethene and ethane are innocuous and are easily degraded aerobically or microaerophilically at the edges of the anaerobic areas generated through substrate emplacement.

The dechlorination process is assessed by interpreting the degradation of parent compounds and formation and subsequent degradation of daughter compounds over time. In a complete reductive dechlorination process, PCE disappearance will lead to an increase in TCE, which will gradually decrease as DCE is formed, which gradually decreases to form VC and so forth as shown in the above equation. In some cases, DCE is not degraded, but accumulates in groundwater. This is a process known as “DCE stall,” and has been attributed to a lack of DCE-dechlorinating bacteria, specifically DHC. The pilot test data showed that this is indeed the case at IRP Site 40, hence the provision to bioaugment with KB-1.

The dechlorination assessment is discussed below and it takes into account COC concentrations in groundwater and soil vapor. It must be noted that for the full-scale project, up to 18 injection points have been used, with monitoring points interdispersed among the injection points, over a 40,000-square foot area. It is thus expected that data would inherently be subject to more variability than was observed in the pilot test data, which involved injection from only one point.

5.1.1 Chemicals of Concern Results

As noted above, COCs for this site include PCE, TCE, DCE, and VC. With respect to DCE, only the data for cis-1,2-DCE are discussed in detail; trans-1,2-DCE has been detected only in trace amounts, with the maximum detection being 4.2 μg/L with 94 percent of all samples indicating concentrations below the detection limit of 1 μg/L.

5.1.1.1 Chemicals of Concern Results in Monitoring Wells

COC results for the baseline and the following 6 months from April through September 2005 are presented in Table 5-1 and are shown spatially on Figure 5-1. COCs trends (molar basis) are shown graphically for each well on Figure 5-2, and plume contours for the COCs are depicted on Figures 5-3 through 5-13 for PCE, TCE, DCE, and VC, respectively. Figures 5-3 through 5-5 depict PCE plume contours for March, June and September events, respectively. Figures 5-6 through 5-8 depict TCE plume contours for March, June and September events, respectively. Figures 5-9 through 5-11 depict DCE plume contours for the March, June and September events, respectively. Figures 5-12 and 5-13 depict VC plume contours for the June and September events, respectively. VC was not detected in any of the monitoring wells during the March (baseline) monitoring event. The plume contours are prepared for the baseline event (March 2005), month of June and month of September 2005, which are 3 months apart.

5.1.1.2 Chemicals of Concern Results in Injection Wells

Over the course of the project, COCs were measured on two occasions on July 5 and August 30, 2005, in injection wells IW-6, IW-8, IW-9, and IW-13 and on one occasion on August 30, 2005, in injection wells IW-7, IW-12, IW-14, and IW-17, in order to assess reductive dechlorination. Results of these analyses are shown on Figure 5-1. These results have generally shown very low levels of PCE and TCE, and elevated levels of DCE. As noted above, VC has been detected in the injection wells located near the original pilot test area. Following installation of injection wells IW-18, and IW-19, groundwater samples from these wells were collected on August 22 and September 16, 2005, respectively, and analyzed for VOCs and general chemistry. These wells indicated PCE concentrations of 150 μg/L and 85 μg/L respectively, prior to biostimulation with sodium lactate.

5.1.1.3 Investigation of Chemicals of Concern Downgradient of Well MW-40-07

Results of COCs in MW-40-07 are included in Figure 5-1. As indicated earlier in Section 4.11.10, five HydroPunch temporary monitoring wells (2-inch-diameter casing, designated as HP-1 through HP-5) were installed downgradient of MW-40-07. Groundwater samples were collected from HP-1 through HP-5 on June 8, 2005, and analyzed for VOCs, general chemistry, and field testing parameters. CVOCs were not detected in the samples collected from HP-1 through HP-5. Ethene was detected in very low concentrations ranging from 2 μg/L to 4 μg/L. COD was not detected in these wells either. A subsequent sampling of three of the wells (HP-1 though HP-3) closest to MW-40-07 was conducted on October 19, 2005, and the samples were analyzed for VOCs. No CVOC were detected in the groundwater samples collected from these three wells, suggesting that the COCs have not migrated from MW-40-07 to these locations.

5.1.2 Contaminant Trends

In order to delineate COC trends, molar concentrations of PCE, TCE, and associated daughter products for each well are presented on Figure 5-2. Several monitoring wells appear to behave as expected based on pilot test data (to varying degrees), i.e., showing evidence of degradation of PCE and TCE, but not of DCE. Wells following this general pattern include MW-40-30, -34, -35, and -37. Wells also following this pattern, but demonstrating potential evidence of DCE degradation (as VC production) as well, include MW-40-14, -31, and -32. As explained below, other data from these wells (discussed in subsequent subsections) generally suggest that substrate is present at these well locations and that microbial activity is occurring and promoting reductive dechlorination of PCE and TCE.

The microbial degradation is not as evident in well MW-40-36. The COC levels are very low in wells MW-40-02, -22, -33, -38, and -39 and the data are inconclusive with respect to the biodegradation activities. Finally, it is noted that VC and trace amounts of ethene detected in wells MW-40-14, MW-40-22, IW-13 and IW-6 (Figure 5-1) are likely related to the former pilot test, as these wells are all located in the vicinity of the test area. Overall, however, PCE and TCE generally appear to be degrading to DCE to varying degrees, and further degradation to VC and ethene is not significant. In addition, some desorption and redistribution of contaminants may be occurring as suggested by fluctuations in COCs concentrations in some wells (MW-40-30, -34, and -37).

Soil vapor data (Table 5-2) shows low concentrations of VC in the vadose zone indicating that volatilization from groundwater is occurring. This is not deemed significant at this time, but is expected to become more significant following bioaugmentation, when more rapid degradation of DCE is likely to occur.

5.1.3 Plume Assessment

Plume maps showing concentration contours for PCE, TCE, and DCE, have been prepared for the baseline monitoring event, the June, and the September events to evaluate changes in COC concentrations and estimated plume extent over the first 6 months (Figures 5-3 through Figure 5-13). The figures suggest that the extents of PCE and TCE impacts generally decreased initially, but some rebound and plume redistribution appears to have occurred. This is mainly apparent in the central portion of the plume, as some downgradient redistribution appears to have occurred in the vicinity of MW-40-36, -37, and -07. The detection of PCE in MW-40-17 during the September monitoring event is unexpected. Although this significantly alters the plume configuration presented in Figure 5-7, it cannot be interpreted as an indication of contiguous expansion of the plume in the easterly direction until further sampling and data analysis can be performed. It is important to recognize that sodium lactate acts as a surfactant, and multiple injection points have been used with interdispersed monitoring wells. As a result, COC measurements are subject to variation and fluctuations during the active injection period, based on localized desorption and other factors such as preferential flow pathways. Therefore, at this time, it is not clear whether the plume is actually moving.

In addition, the extent of DCE has generally increased, which is consistent with pilot test findings suggesting the absence of adequate DCE dechlorinating bacteria (DHC). While significant reduction in PCE and TCE plume extents are not clearly apparent at this time, we believe that overall (as explained in the prior and subsequent subsections), the data indicate the onset of the dechlorination process to a reasonable degree at this stage of the project. In addition, bioaugmentation has recently been conducted, and if it is to be successful, the effects should become evident over the next several months, including reduction of PCE and TCE, as well as DCE plume extents.

Regarding the area downgradient of MW-14-07, COC concentrations in MW-40-07 have increased since the baseline measurements were taken from 48 μg/L to 110 μg/L. No COCs were detected in the downgradient temporary HydroPunch groundwater monitoring wells HP-1 through HP-5 samples (Figure 5-1); however, trace amounts of PCE have been detected in MW-40-39, which is further downgradient of the temporary HydroPunch monitoring well locations. Injection wells IW-18 and -19 have been installed, and as of September 2005, lactate injections have commenced to begin treatment of this area.

Finally, PCE was detected during the September monitoring event in Well MW-40-17 at 16 μg/L. PCE had not previously been detected in this well, which is located cross-gradient with respect to the main plume area, over 150 feet from the nearest injection well (IW-10). It is not presently clear if this is an anomalous measurement, or whether it could be a result of displacement due to the lactate injections. However, COC concentrations will continue to be monitored in this area, and investigations will be conducted to address this issue if detections persist. It is noted that this is not completely unexpected, as the current remedy allows for residual COCs not addressed by active treatment to be mitigated via natural attenuation.

5.1.4 Substrate Indicator Parameters

The substrate-indicator-parameters results including COD, TOC, and VFAs are presented in Table 5-3. COD and TOC trends are plotted on Figure 5-14. VFA trends are plotted on Figure 5-15.

5.1.4.1 Lactate Distribution/Fate

Substrate distribution was monitored via measurement of TOC, COD, and VFAs in monitoring wells to assess distribution throughout the aquifer. Lactate is readily soluble within the subsurface and is subject to rapid biological degradation. This generates organic metabolites VFAs, which (along with lactate) include acetate, butyrate, propionate, and pyruvate. In addition, COD was determined to be an acceptable surrogate for assessing lactate and its breakdown products. TOC was also measured. COD and TOC, when assessed against background data, essentially represents the total available organic electron donor. Although TOC correlated reasonably well with the other data in most cases, COD, along with VFAs are the focus of the assessment of lactate migration.

5.1.4.2 Chemical Oxygen Demand

COD was measured in monitoring wells through both field (biweekly) and laboratory (monthly) analyses. The purpose of the biweekly field analysis was to aid in operational adjustments such as adjusting lactate injection rates, frequency and duration, as the injection process was ongoing. However, in practice, lactate migration was generally slower than expected, and more readily available field data were not necessary for urgent field adjustments. In most cases, there was reasonable correlation between the laboratory and field data for the purposes of detecting COD in monitoring wells. Because laboratory data are typically more reliable than field data, laboratory COD data are used to assess lactate migration. The filed COD measurements will be discontinued, since laboratory COD data are sufficient for evaluation of lactate migration.

As reflected by the trends in Figure 5-15, laboratory COD data suggest that substrate had reached most of the monitoring well locations by the end of September, with concentrations ranging from slightly over the detection limit of 10 mg/L to over 24,000 mg/L in MW-40-35. The rate of lactate migration was variable, with initial rapid migration to wells MW-40-31 and -35, which are screened at deeper intervals than the other wells. Lactate migration to many of the other wells is relatively recent (MW-40-30, -33, -36, -37, -38). Hence, over time, COD concentrations have generally shown increasing trends to varying degrees in all wells (with the possible exception of MW-40-39), which provides evidence of lactate migration.

Pilot test data from MW-40-24, located at a comparable distance from the injection point MW-40-28, are actually in reasonably good agreement with the full-scale data. For example, COD data from MW-40-24 collected during the pilot test showed no appreciable increase over approximately the initial 3 months of injection (under a comparable injection regime as the full scale EISB). In addition, minor increases in COD levels were observed thereafter (up to 281 mg/L, but generally much lower) and were variable, and indicated that MW-40-24 was “very near the limit of significant electron donor distribution” (BEI, 2004). Pilot test COD levels for MW-40-24 are reasonably consistent with, and lower in some cases, than COD levels observed in the full-scale EISB implementation.

It is noted that COD transport to MW-40-30, -36, and -37, which are located in the central portion of the plume, appears to be minimal relative to other wells. The pilot test showed that large amounts of substrate are not necessarily required for reductive dechlorination to occur (e.g., MW-40-24), and some evidence of reductive dechlorination is apparent in these wells (refer to Figure 5-2). However, future lactate injections will be adjusted to target this area.

Finally, COD data indicate that vertical migration of lactate (below the plume) may be significant. This includes relatively large increases in COD levels in monitoring well MW-40-31, which is screened from 42 to 52 feet bgs; MW-40-35, which is screened from 45 to 55 feet bgs; MW-40-20, which is screened from 50 to 60 feet bgs; and to a lesser amount in MW-40-13, which is screened from 45 to 55 feet bgs. Refer to Table 3-1 for well construction detail and Table 5-3 for COD concentrations. Much lower COD concentrations were noted in nearby wells that are screened in shallower zones at depths of 5 to 35 feet bgs. This is consistent with the fact that lactate solutions are denser than water.

5.1.4.3 Lactate Breakdown Products

As mentioned previously, lactate is biodegraded to form VFAs. These generally include acetate, butyrate, propionate, and pyruvate. Accordingly, lactate and its breakdown products were measured monthly in samples from monitoring wells through laboratory analysis to establish and/or confirm that the substrate was delivered to the appropriate zone, to track its area of influence, and to assess whether or not it is being metabolized as expected.

As shown in Figure 5-15, significant concentrations of VFAs were detected only in wells where COD was present at the highest concentrations (MW-40-14, -31, -32, -34, and -35), with trace amounts being detected in other wells. In these cases, all VFAs were present, providing evidence of degradation by native bacteria, as expected. COD data suggest that lactate migration to many of the other wells (MW-40-30, -33, -36, -37, and -38) is relatively recent, and for these wells and others in which increasing COD trends are less apparent, it is expected that VFA data will help verify whether lactate is present and being metabolized.

5.1.4.4 Radius of Influence

The design ROI for the injection well field was 25 feet in the downgradient direction and 20 feet in the cross-gradient direction. Detection of COD at many monitoring wells suggests that lactate is present over much of the site; however, coverage may not be complete in several key areas, mainly in the vicinity of MW-40-36 and -37. The pilot test data suggests that while significant effects of lactate injection were measured 20 feet from the injection point, 25 feet is on the outer fringes of the radius of lactate influence (MW-40-24, located 25 feet from the injection point, was only slightly impacted by lactate) (BEI, 2004). It is also noted that in the full-scale project, some difficulty was observed in injecting lactate into IW-15, located immediately upgradient from MW-40-37 (refer to Section 4.11.7). This may have inhibited lactate distribution in that area. Overall, however, it appears that the design ROI is reasonably consistent with the pilot data. In addition, because most of the monitoring wells are located more than 25 feet from the nearest injection point, it is likely that coverage is better than the COD and VFA data suggest (as indicated, to some degree, in the following subsections).

5.1.5 Geochemical Parameters

Geochemical parameters were measured in monitoring wells in support of process assessment through biweekly field analyses and monthly laboratory analyses. Geochemical parameters that were measured include: Fe(II), NO_3^-, NO_2^-, alkalinity, SO_4^{2-}, DO, ORP, pH, biogenic gases (methane, hydrogen sulfide, hydrogen, CO_2). Results of these analyses are presented in Table 5-4 (field testing parameters) and Table 5-5 (laboratory analytical results for geochemistry parameters), and the trends are shown graphically on figures included in Appendix F for each monitoring well. Geochemical parameters were not assessed in injection wells, with the exception of measuring the ORP on several occasions prior to bioaugmentation.

For some of the geochemical parameters, including alkalinity, nitrate, sulfate, and carbon dioxide, both monthly laboratory and biweekly field measurements were taken with the expectation that the field measurements would be helpful in characterizing geochemical processes. However, for these parameters, the monthly laboratory data were sufficient to provide a reasonable picture of subsurface conditions at the site. While all of the data are included on figures presented in Appendix F, the discussion below focuses on key laboratory data, and on the field data in the cases of DO, ORP, pH, and Fe(II).

5.1.5.1 Terminal Electron Acceptors

A variety of terminal electron acceptors can be used sequentially by soil microorganisms, in conjunction with biological oxidation of a substrate (lactate). The preferred electron acceptor for facultative bacteria (capable of aerobic or anaerobic respiration) is oxygen, which provides the greatest amount of energy for growth. When oxygen becomes depleted, the next most effective electron acceptor is preferentially used. The general sequence of electron acceptor use and the associated ORP ranges are as follows:

Electron Acceptor	Indicator Parameter	Approximate ORP millivolts (mV)
Oxygen	Oxygen disappearance (onset of anoxic conditions)	800
Nitrate	Nitrate disappearance	700
Manganese (IV)	Manganese (II) formation	500
Iron (III)	Iron (II) formation	-50
Sulfate	Sulfate disappearance; hydrogen sulfide formation	-220
Organic Compounds (fermentation)	Hydrogen formation	-220
Carbon Dioxide	Methane formation	-240

Modified from Pilot Test Report (BEI, 2004).

Reductive dechlorination is generally expected to be most effective in the sulfate-reducing range or lower.

Lactate-driven biological activity should be reflected by depressed levels of electron acceptors (DO, NO_3^-, and SO_4^{2-}) or increases in Fe(II) formation relative to baseline parameters. In summary, changes in these geochemical parameters along with measured ORP infer areas of biological activity and provide information about the oxidation/reduction status of the system.

Dissolved Oxygen and Nitrate

DO and NO_3^- were present only at very low concentrations at all monitoring locations during the baseline event and all subsequent events, and thus did not exhibit significant trends (Table 5-4 and Appendix F). This provides preliminary evidence that groundwater beneath the site is anoxic but does not provide specific information about the ORP.

Sulfate and Alkalinity

Sulfate trends are presented by location in Figure 5-16 and provide evidence of sulfate reduction to varying degrees in many of the monitoring wells located in the central area of the plume (MW-40-14, -30, -31, -32, -33, -34 -35). This is indicative of optimal conditions for reductive dechlorination. Sulfate reduction is not apparent in other wells, including MW-40-02, -22, -36, -37, -38, -39. As shown in Figure 5-16, several of these wells are located on the fringes of the plume, with the exception of MW-40-36 and -37. However, COD data for these wells suggest that lactate migration to these locations has been relatively recent (Figure 5-14), and with continued injections, this is expected to stimulate sulfate reduction in these areas, which will be monitored over the next several months. In addition, CO_2 is generated from metabolism of lactate, which forms bicarbonate (at relevant pH levels), and will be reflected in increased alkalinity. The data suggest that alkalinity increased in MW-14, -31, -32, -34, and -35 as a result of biological respiration.

5.1.5.2 Biogenic Gases

Gaseous by-products of various biological processes (biogenic gases) were monitored in groundwater through laboratory analysis, including methane, hydrogen sulfide (H_2S), molecular hydrogen (H_2), and CO_2. These analytes are useful as indicator parameters for assessing the status of in situ bioprocesses. CO_2 is produced through aerobic degradation of organic carbon, as a by-product of fermentation, and is also used as a terminal electron acceptor in biological production of methane (methanogenesis). As the environment becomes more reduced, increases in production of hydrogen sulfide, methane, and molecular hydrogen, provide evidence that the environment is favorable for reductive dechlorination. Molecular hydrogen is directly used as an energy source (electron donor) by DHC in reductive dechlorination. Reductive dechlorination is most efficient when the concentration of molecular hydrogen is between 2 and 10 nanomoles (nM). Results of biogenic gas analyses are presented in Table 5-6 and are also plotted on the graphs presented on Figures 5-17 and 5-18.

CO_2 has increased in most of the monitoring wells (except MW-40-02) to varying degrees, providing evidence of general biological activity (Figure 5-17). In addition, increases in the levels of methane, and in some cases H_2S, are apparent in all wells, except MW-40-02, -33 -38, and -39 (Figure 5-18). This provides further evidence of that the environment is substantially reduced in key areas of the plume, and the recent detection of COD in wells MW-40-36 and -38 is expected to stimulate biological activity in these areas as well. Data for molecular H_2 show anomalously high spikes at several wells on May 28, 2005, and in all likelihood, were not reflective of actual field conditions at the time; therefore, these data have been discounted in the analysis. In general, the molecular H_2 data show modestly increasing trends at MW-40-02, -14, -22, -30, -31, -32, -37, -38, and -39. More markedly increasing trends are observed at MW-40-33, -34, -35, and -36. Molecular H_2 concentrations are above 2 nM at all monitoring wells except for -38 and -39, which are located at the plume boundaries, and thus molecular H_2 is generally present in concentrations that are supportive of reductive dechlorination throughout the plume.

5.1.5.3 Oxidation/Reduction Potential

ORP data (Table 5-4, Appendix F) show that initial ORP levels in monitoring wells that were measured in mid-March during the baseline event were unrealistically low. The ORP instrument was changed out at this time. Although the readings over the next several months exhibited some fluctuations, they were generally indicative of reducing conditions in line with other geochemical data (this is not unexpected, as ORP can take several months to stabilize). However, ORP data collected from early-July through the end of August were increasingly at odds with other geochemical data (electron acceptors and biogenic gases), which suggested more reduced conditions over that time. Thus, it became increasingly apparent that the ORP measurements might have been inaccurate (this is a transitory measurement, obtained using a field instrument and is generally considered to be difficult to measure accurately). In September, investigations were conducted to verify the ORP readings using another instrument. These investigations indeed showed that the previously used ORP instrument was yielding inaccurate measurements. Data were collected using the new instrument beginning in mid-September and reflect strongly negative ORP values, which is in agreement with other geoparameter data suggesting that reducing conditions are present at most locations within the treatment zone. Measurements that are believed to be unreliable include those taken during the baseline event and events conducted between early July and late August. Readings conducted in April through the end of June are in reasonable agreement with other geoparameter data (given variation inherent in this analysis), and are thus considered to be more reliable.

5.1.5.4 Fe(II) and pH

Fe(II) and pH data are provided in Table 5-4, and trends are included in graphs presented in Appendix F. The data show that Fe(II) has been detected infrequently and sporadically at low levels and has not provided a clear indication that Fe(II)-reducing conditions are present. In addition, pH values observed are consistently between 6.0 and 8.5, which are in the range considered acceptable for biological activity. In most cases, pH has trended slightly downward over time, which is consistent with production of organic acids via degradation of lactate. Fe(II) is produced as a byproduct of microbial reduction of Fe(III) under anaerobic conditions. Fe(II) is soluble, and increasing concentration trends generally indicate microbial activity in a reducing environment.

5.1.5.5 Summary of Oxidation-reduction Environment

It is important to note that numerous geochemical parameters measured at multiple locations over several sampling events are subject to variation based on a number of spatial, temporal, and analytical factors. Thus, in projects of this nature, data rarely present a complete picture of subsurface conditions. Thus, a "weight of the evidence" approach is commonly used to describe subsurface conditions. Based on the discussions above, the data collected thus far as a whole suggest that much of the subsurface is under strongly reducing conditions in the general range of sulfate reduction. This is especially true for most of the areas within the critical central area of the plume, with the possible exceptions of MW-40-36 and -37. However, COD data indicate that substrate has only recently migrated to these locations, and confirmation of this and impacts to the subsurface environment are expected to become evident over the next several months.

5.1.6 Microbiological Indicators

Microbial assessment included: (1) DNA analysis for enumeration of the specific reductive dechlorinating organism DHC, which is considered integral in the reductive dechlorination process (mainly the reduction of DCE), and was previously found to be absent from the site, and (2) PLFA analysis, mainly as a measure of overall biomass, and secondarily, as an indicator of microbial community structure. Results of the DNA analyses and PLFA biomass measurements are presented in Table 5-6 and are graphed on Figure 5-19. PLFA community structure data are included in Table 5-7 and graphs of relevant trends are included as Appendix G.

Additional DHC analyses were performed in samples from selected injection wells. Microbial analyses are discussed in the following subsections. It is noted that microbial cells typically adsorb to soil particles, and thus analysis of water samples for microbial parameters may be subject to several sampling-related uncertainties. These can include underestimation of cell quantifications due to sorption and to inconsistencies in data due to irregular desorption of cells during purging and/or sampling activities. Therefore, substantial time may be required for meaningful trends to appear.

5.1.6.1 DNA-based Microbial Indicators

It is currently believed that DHC-like organisms are required to bring about complete dechlorination of CVOCs (specifically the step involving dechlorination of DCE isomers to VC and ethene). Data from the pilot test supported this contention, as DHC was not detected at the site (prior to bioaugmentation), and no DCE degradation was observed until bioaugmentation was performed (BEI, 2004). As indicated in Figure 5-19, the DHC data from the monitoring wells indicate that there may be low levels of DNA associated with a native DHC strain that was not detected in the pilot study, or (less likely) in some areas, possibly the bioaugmented strain (or DNA, not live organisms) of DHC originally from the pilot test. However, since concentrations have not increased appreciably during the last 6 months [even in wells where appropriate conditions are present (MW-40-31 and -35)], it may be assumed at this time that these cells (or DNA) are likely incompetent (very slow growing and possessing limited capacity for reductive dechlorination) or are at levels too low to rapidly impact the concentrations of chlorinated ethenes. A minimum initial target concentration of 10^5-10^6 living DHC cells/L in the bioaugmented groundwater is typically required for effective bioaugmentation. At present, it would appear that this threshold has not been achieved in any portions of the site, as was achieved using KB-1 directly in the pilot test area (which reached 10^8 cells/L shortly after bioaugmentation). This supports direct bioaugmentation with KB-1, which was conducted on September 19 and 21, 2005.

In addition, as noted in Section 4.11.11, an attempt was made to transfer DHC-laden water from MW-40-27 (injection well IW-05) to other injection wells. Measurements of DHC were made via Q-PCR analysis in three of the injection wells (IW-6, IW-8, and IW-13) immediately following transfer (July 5 and 6, 2005) and approximately 2 months afterward (August 30, 2005). Data are presented in the following table.

	DHC (cells/L)	
Injection Well	**July 2005**	**August 2005**
IW-6	<9.9 E+02	1.95 E+07
IW-8	1.91 E+05	6.69 E+06
IW-13	3.43 E+07	2.08 E+07

While DHC was detected in the three injection wells, increases were substantial in two of the three wells, indicating that transfer of viable cells may have been only marginally successful. It is likely that the previously bioaugmented area around the former pilot test wells (including IW-5) contain CVOC levels, which are too low to support growth of DHC, since CVOCs are needed for DHC to respire, (Cupples et al., 2004). Therefore, given the time they have been in that environment, the cells are potentially dead or have a low viability.

5.1.6.2 PLFA-biomass

As indicated by the graphs in Figure 5-19, order of magnitude increases in total biomass over the baseline analysis have been measured in MW-40-14, -30, -31, -32, -34, and -35. As can be seen in Figures 5-14 and 5-15, these wells are among those with the highest substrate concentrations, as would be expected. A lack of increasing total biomass in wells MW-40-36 and -37 are consistent with minimal evidence of substrate transport to these areas (Figures 5-14 and 5-15).

Community profiles are presented in Appendix G. PLFA profiles reflect various PLFAs that are indicative of the presence of broad groups that are present within the microbial community in varying amounts. These groups are characteristically active under various ORP conditions, and can thus reflect ORP-specific metabolic processes. Therefore, constant or varying predominance of certain groups can reflect ORP status and related changes in the subsurface. In addition, physiological status markers are certain PLFAs that indicate how bacteria are responding to their environment with respect to nutritional stress, i.e., starvation ("slowed growth index") and toxic conditions ("permeability index"). Regarding the former, when there is no substrate or substrate is depleted, bacteria are "starved," and certain PLFAs that are produced during normal growth are converted to other forms. Similarly, when bacteria are exposed to "toxic" conditions (contaminants at high enough levels), they make certain types of PLFAs relative to others to strengthen their membranes (i.e., make it less permeable). "Slowed growth index" and "permeability index" are defined as the ratio of the amount of PLFAs produced in response to starvation or toxic stress to the biosynthetic precursors produced under normal conditions. Importantly, these measurements subject to the same general variability inherent in all microbiological assays and are thus, considered estimates.

In general, community profile biomarkers indicate a reasonably diverse community structure. To assess conditions related to reductive dechlorination, several microbial groups are of particular interest. These include sulfate-reducing bacteria (SRB) and metal-reducing bacteria, both of which are active and would be expected to increase and/or predominate under conditions favorable for reductive dechlorination. Firmicutes, a general group of bacteria that includes several anaerobic fermentors are of interest as well (H_2 gas is a by-product of fermentation, and serves as the energy source for reductive dechlorinators). With regard to SRBs and metal reducers, preliminary analysis of these data indicate that consistent increases in biomarkers indicative of these groups are not substantial, even in wells where increases in H_2S were noted (MW-40-14, -31, -34, and -35). Conversely, increasing trends in percentages of Firmicutes were noted in several cases where H_2 appeared to be increasing. Although the H_2 data exhibit considerable variability, H_2 was detected in essentially every monitoring well. Reasonably clear increasing trends are exhibited in MW-40-14, -30, -31, -32, -33, -34, and -35. Of these, corresponding increases in percentages of Firmicutes were noted in MW-40-14 and -31, with less clear increasing trends in MW-40-33- and -35.

Slowed growth index would be expected to be low under conditions where substrate is available and elevated under conditions where substrate is limited or depleted. Observed solubility index values were consistently low in most of the wells, (MW-40-02, -14, -22, -30, -31, and -33), suggesting normal bacterial growth for most of the samples analyzed. Increasing slowed growth index trends were observed for MW-40-35 and -39, suggesting that substrate became limiting with time in these well locations. However, COD data suggest that MW-40-35 was consistently supplied with lactate and that lactate was only sparingly present in MW-40-39 over the entire injection period. In addition, highly variable slowed growth index values were observed in MW-36 and 38, both of which appear to have received limited substrate. Changes in slowed growth index in these wells are considered anomalous.

With respect to permeability index, contaminant concentrations are relatively low at this site, with a maximum in the 300-μg/L range, and generally much lower, and are not believed high enough to generate toxic conditions for bacteria. Toxic effects are more likely to be present in source areas with COC levels near solubility limits (in the mg/L range, e.g., 150 mg/L for PCE). However, as with starvation index, increases could become apparent if significant COC desorption were to occur. Contaminant desorption was only clearly observed in three wells: MW-40-31, -34, and -36, and concentrations were relatively low (approximately 300 μg/L or less). Increases in permeability index were observed in several wells, including MW-40-14, -22, -30, -31, and -35. The only well in which increases in both COC levels and toxicity index were observed is MW-40-31; however, based on the low COC concentrations observed, it is unlikely that this observation is related to contaminant toxicity.

In summary, the PLFA community profiling data are in marginal agreement with other geochemical data at this point, and provide some, but not conclusive, evidence of a shift to an anaerobic environment. This, in conjunction with total biomass data (which exhibits increases in some areas), may indicate a need to supply additional substrate.

5.1.7 Summary of General Performance Assessment

A summary of the general performance assessment for each monitoring well is shown in Table 5-9. The data generally indicate that the system is performing as expected, based on the pilot data. Evidence of biological activity, strongly reducing conditions, and transformations of PCE and TCE are evident at essentially all monitoring locations, though to varying degrees, and rebound of PCE and TCE has occurred in several instances. Regarding COD levels, pilot test data from MW-40-24 (located approximately 25 feet downgradient from the injection point) are actually in reasonably good agreement with the full-scale data. For example, COD data from MW-40-24 collected during the pilot test showed no appreciable increase over approximately the initial 3 months of injection (under a comparable injection regime). Moderate increases in COD levels observed thereafter (up to 281 mg/L, but generally much lower) were variable, and indicated that MW-40-24 was "very near the limit of significant electron donor distribution"

(BEI, 2004). These levels are reasonably consistent with, and lower in many cases, than COD levels observed in the full-scale project. It is noted that substrate transport to several key wells (MW-40-34, 36, and 37) has been relatively slight and inconsistent, and while evident to some extent, COC trends have not demonstrated conclusively that reduction of PCE and TCE is occurring. However, more time is required to assess whether the system performance will improve following bioaugmentation and continued lactate injection.

5.2 SOIL GAS MONITORING AND SAMPLING ANALYSIS RESULTS

Soil gas was measured in the field in soil vapor/gas monitoring wells VW-40-01, through -06; and 24 ½-inch-diameter PVC probes that are installed next to the 4-inch well casings in each of the 16 injection wells (IW-1 through -4, and IW-6 through -17), and monitoring wells MW-40-30 though -39. Soil gas samples were collected from all six soil gas monitoring probes (VW-40-01 through -06) and the nested probes in IW-1, -3, and -7, and MW-40-34. Field monitoring of the soil gas/vapor wells and probes were used to evaluate methane, H_2S, oxygen, CO_2, CO, and VOCs concentrations in the vadose zone. A summary of field testing results including data for methane and hydrogen sulfide are presented in Table 5-10 and in Figure 5-18. Monthly field soil gas monitoring data including probe monitoring and surface emissions monitoring results are provided in Appendix H.

Soil vapor/gas monitoring and surface emissions monitoring were conducted on monthly basis. In addition, soil vapor samples were also collected on a monthly basis and analyzed in the laboratory for VOC and for fix gas analysis, which included methane, CO_2, ethene, and ethane. Laboratory analysis results for soil vapor/gas samples are presented in Table 5-2. The results of seven sampling events including the baseline event and months of April through September 2005 are discussed in this section.

Laboratory analysis results for the seven monthly sampling events indicated PCE concentrations in soil gas samples ranging from as low as 310 micrograms per cubic meter ($\mu g/m^3$) in VW-40-05 (located about 20 feet north of Building 239) and up to 123,000 $\mu g/m^3$ in the nested probe in IW-7 (located about 25 feet south of Building 240). TCE concentrations in soil gas samples ranged from as low as 24 $\mu g/m^3$ the nested probe in MW-40-34 and as high as 15,200 $\mu g/m^3$ in the nested probe in IW-1. DCE in soil vapor samples collected at the site ranged from as low as 10 $\mu g/m^3$ in VW-40-03 to as high as 40,000 $\mu g/m^3$ in the nested probe in IW-1. VC concentrations ranged from as low as 34U $\mu g/m^3$ in the nested probe in MW-40-34 to as high as 10,400 $\mu g/m^3$ in VW-40-01. Neither ethene nor ethane gas concentrations were detected in soil vapor samples for all the wells analyzed during the seven events. Persistent elevated methane concentrations were present in potentially explosive levels in the vadose zone evidenced by soil gas samples results collected from 6 out of the 10 wells, including VW-40-01, -02, and -03, and the nested probes in IW-1, -3, and -7. The highest methane gas concentrations in these wells were 81.1 percent, 76.7 percent, 79.5 percent, 67.1 percent, 15.5 percent, 45.2 percent, respectively. Refer to Table 5-2.

Field measurements of methane gas concentrations in soil gas probes are generally consistent with the laboratory data for the same wells. Methane concentrations generally stayed in the same range in VW-40-01, -02, and -03 during the months of April through September 2005 (Figure 5-20). In general, the concentrations of methane gas increased in all other nested probes, with the exception of VW-40-04, and 05, and IW-13, MW-40-31, -33, -38, and -39 in which no significant methane gas concentrations were detected. The field monitoring results indicate that since the beginning of the biostimulation, methane gas was detected in an increasing number of nested probes. The highest methane concentration was detected in the nested probe in IW-14 at a concentration of 92 percent in air, during the September 27, 2005, event. During the September 27, 2005, monitoring event, 24 out of 32 wells and probes indicated a methane concentration reading exceeding the LEL and ranging from 8.6 percent to 92.8 percent with and average of 59.8 percent. Methane gas concentrations increased over the course of remediation and continue to remain high. Methanogenesis is a biological process that is expected under the reducing conditions necessary for reductive dechlorination.

The highest H_2S concentrations were detected during the months of June and August 2005 field testing events (Figure 5-20). H_2S was detected in the majority of the nested probes in the injection wells. H_2S was detected intermittently in the soil gas wells (VW-40-01 through -06) and the nested probes in the monitoring wells MW-40-31 through -39. H_2S was detected at concentrations of greater than the equipment detection range (greater than 200 ppmv) in the nested probes in IW-2, -10, -12, and -14.

5.3 SURFACE EMISSIONS MONITORING RESULTS

Surface emissions monitoring was conducted on a monthly basis (generally at the end of each month) to detect surface emissions of methane gas in and around Buildings 239 and 240, and in the cracks in the pavement around Building 240 and at the southwest, west and northwest sides of Building 239. Surface emissions monitoring results indicate that methane gas was not detected in significant concentrations above the surface at the site, in the areas where monitoring was conducted inside Buildings 239 and 240, and inside utility manholes located within and in the vicinity of the site. Methane concentrations ranged from, for the most part, non-detect to 0.3 percent. Surface emission monitoring results are presented in the figures provided in Appendix H-2.

5.4 WATER LEVELS MEASUREMENT RESULTS

Groundwater level data are presented in Table 5-11. It had been anticipated that groundwater mounding effects might occur during substrate injection, but based on the groundwater level data, this has not been the case. Groundwater elevation contours are shown in Figures 5-21, 5-22, and 5-23. In addition, groundwater elevation trends for select groundwater monitoring wells for the monitoring period from March through September 2005 are shown on Figure 5-24. Figure 5-25 shows the groundwater trends for the injection wells for the period from April through September 2005. Due to the effects of the sodium lactate injection, groundwater levels are slightly different from the nearby monitoring wells.

Notable observations are as follows:

- The two rounds of lactate injection did not appear to cause any significant degree of groundwater mounding, indicating that the formation was readily able to accept the rate of lactate injection. Refer to Figures 5-21 through 5-23 for groundwater elevation contour maps for March, June, and September 2005.
- The two rounds of lactate injection did not appear to affect the groundwater gradient starting from the plume center in the eastern direction; the two rounds of lactate injection appear to have increased the groundwater gradient starting from the plume center in the southeasterly direction by up to approximately 25 percent, which may potentially explain the increasing COC concentrations in MW-40-07.
- Hydrographs shown in Figures 5-24 and 5-25 show decreasing water levels in all wells, including injection wells and monitoring wells, from April 2005 to October 2005. In general, the magnitude of the decrease is approximately 0.5 feet for all the wells, suggesting, most likely, a regional seasonal change in the water table.

Groundwater levels will continue to be monitored, on monthly basis.

5.5 CONTAMINANT MASS BALANCE

Because it is still early in the process and significant COC degradation is not yet apparent, a contaminant mass balance is not expected to provide much insight at this time. This will be addressed in the next report.

5.6 AQUIFER QUALITY

A number of concerns related to the EISB system's impact on aquifer quality were identified during the pilot test as follows:

- Desorption/redistribution COCs
- Initial decreases in pH
- Increase in COD – Subject to initial increases during lactate injection period, expected to decrease as lactate and breakdown products naturally degrade within the aquifer
- Decreases in ORP
- Increases in Fe(II)
- Increases in H_2S

- Methane production
- Production of 2-butanone
- Metals solubilization

Each of the above listed effects is inherent in the EISB process and has been observed to some extent in the full-scale implementation of the EISB, including the production of 2-butanone. 2-butanone was detected at monitoring wells MW-40-14, -31, -32, -34, and -35 at concentrations up to 560 μg/L (refer to Appendix D for 2-butanone laboratory results). The EISB process will likely continue to impact water quality at least throughout the active treatment period. Each of these effects is directly related to injection and metabolism of sodium lactate, and all effects are considered temporary (BEI, 2004). Following the active treatment period (i.e., when COC levels are below TCGs over the majority of the site), lactate will no longer be supplied to the subsurface. At that time, the project enters a natural attenuation phase, during which these parameters will be routinely monitored, and are expected to return to background levels.

5.7 ATTAINMENT OF THE TARGET CLEANUP GOALS

As noted in Section 1.2, the TCGs for IRP Site 40 groundwater are listed in Table 1-1. During the pilot test, TCGs were attained for PCE and TCE, but not for cis-1,2-DCE or VC (although levels were decreasing at the end of the test) (BEI, 2004). As it is early in the project (bioaugmentation was conducted as this report was being prepared), an assessment of the ability of the process to meet target cleanup goals is not possible. This will be addressed in subsequent semiannual or monthly summary reports.

5.8 HEALTH AND SAFETY CONSIDERATIONS

Health and safety concerns that were identified in the pilot study focused on generation of methane, hydrogen sulfide, and VC. These gasses were measured in soil gas (Table 5-2) and in ambient air samples (Table 5-10).

5.9 MONITORED NATURAL ATTENUATION WELLS

As stated in the Work Plan (TtEC, 2005), once the performance monitoring well(s) within the active remediation area indicates that CVOC concentrations have reached asymptotic levels for two consecutive quarters or indicates no significant further reduction in contaminant concentrations from continued treatment, and if the CVOC concentrations are less than 10 times their respective TCG levels, the well(s) will be added to the list of MNA monitoring wells. This condition has been met by several of the wells within the site including MW-40-02, -22 and -33. Concentrations of PCE in these wells ranged from 7.9 μg/L to 15 μg/L in MW-40-02 and were non-detect in MW-40-22 and -33. TCE concentrations ranged from 0.49J μg/L to 1.4 μg/L in MW-40-02, and 0.44J μg/L to 2.7 μg/L in MW-40-22, and were non-detect in MW-40-33. DCE concentrations ranged from non-detect to 0.97J μg/L in MW-40-02 and 1.4 μg/L to 3.0 μg/L in

MW-40-22; and were non-detect in MW-40-33. VC concentrations ranged from non-detect to 1.9 μg/L in MW-40-22. VC was not detected in MW-40-02 and -33. Very low concentrations of ethane were detected in the groundwater samples collected from the above three wells for the baseline event and the subsequent six monitoring events ranging from non-detect to 1.3 μg/L. Therefore, these wells will be recommended to be monitored on a quarterly basis and added to the list of MNA monitoring wells.

6.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

The following subsections summarize the findings from the first 6 months of EISB system operations and recommends certain actions for improvement of the system performance.

6.1 SUMMARY OF FINDINGS

Major findings are summarized as follows:

1) In general, the system is behaving consistently with the pilot test.

2) Regarding COCs, data from the monitoring wells appear to show some variations across the site with respect to reductive dechlorination of the CVOCs. Overall, consistent with the pilot test, preliminary COC trends show conclusive evidence for reductive dechlorination of PCE and TCE, but less evidence for reductive dechlorination of DCE.

3) Figure 6-1 depicts the overall distribution of PCE and TCE with time. Figure 6-2 depicts overall distribution of DCE and VC with time. Plume boundaries presented in Figure 6-1 suggest that the extents of PCE and TCE impacts generally decreased initially, but some rebound and downgradient redistribution appears to have occurred in the vicinity of several of the monitoring wells including MW-40-07, and -17. This is not completely attributable to substrate injection activities, as PCE was detected in well MW-40-07 during the baseline monitoring event (before injection was conducted). However, it is now evident that PCE levels in this well are generally increasing. With regard to MW-40-17, the single detection of PCE in September has significantly altered the plume configuration. However, this cannot be interpreted as an indication of contiguous expansion of the plume in the easterly direction until further sampling and analysis are performed.

   DCE contours presented in Figure 6-2 suggest that the extent of DCE has generally increased, which implies degradation of PCE and TCE, and is consistent with pilot test findings. Minor amounts of VC are also apparent, and may have increased at several locations. In interpreting these data, it is important to recognize that sodium lactate acts as a surfactant, and multiple injection points have been used with inter-dispersed monitoring wells. As a result, COC measurements are subject to variation and fluctuations during the active injection period, based on localized desorption and other factors such as preferential flow pathways. Therefore, at this time, it is not clear whether the plume is actually moving.

4) Substrate appears to be present at (and/or affecting) many critical monitoring points. Because most of the monitoring wells are located more than 25 feet from the nearest injection points at the fringe of the ROI (as determined in the pilot test), it is likely that coverage is more complete than the data currently indicate.

5) Based on the weight of the evidence, substrate has likely produced geochemical conditions favorable for reductive dechlorination at most locations within the aquifer and will likely continue to expand to other locations as injection continues. Localized

migration into the deeper wells is shown to be relatively quick and may suggest that the vertical migration of sodium lactate is relatively rapid, but horizontal migration is slower. However, evidence of horizontal lactate migration (including evidence based on geochemical analyses results) to important areas of the plume, is increasingly apparent.

6) The DHC data from the monitoring wells indicate that there may be low levels of DNA associated with a native strain (not detected in the pilot study) or in some areas, possibly the bioaugmented strain of DHC (originally from the pilot test). However, these organisms are either incompetent, dead, or at levels too low to rapidly impact the concentrations of chlorinated ethenes. A minimum initial target concentration of competent living DHC cells in the range of 10^5-10^6 cells/L in the groundwater is typically required for effective bioaugmentation. The data suggested that this threshold had not been achieved and/or sustained over most of the site, as was achieved using KB-1 directly in the pilot test area (reached 10^8 cells/L shortly after bioaugmentation). Hence, bioaugmentation with KB-1 was conducted following the first round of sodium lactate injection in September 2005.

7) The decision to bioaugment was made based on the rationale that: a) much of the site does appear to be appropriately reduced, b) continuing lactate injection will expand the reduced area, c) reduced conditions were verified in the injection wells, and are expanding outward radially. KB-1 can be expected to follow the expanding reduced "envelope" surrounding the injection wells during subsequent lactate injections. Thus, it is reasonable to assume that KB-1 will be effective, and survival will be high, as was observed in the pilot test. Further, there wasn't much to be gained by waiting for complete lactate coverage prior to bioaugmentation – this is reasonably adequate now and is expected to continue to improve with time. KB-1 was injected so it has a chance to incubate and grow/migrate while general microbial activity is reasonably high.

6.2 RECOMMENDATIONS

The following recommendations are made, based on the data evaluation to date, and the conclusions described above:

1) Resume lactate injections, however, at a reduced rate. This will continue to provide the electron donor required to maintain appropriate conditions for the recently injected inoculum and will aid in transport of the bioaugmented organisms radially from the injection points. The frequency of sodium lactate injection in the bioaugmented injection wells will be reduced to half of the initial frequency (at once a week) in order to minimize the potential for contaminant migration and may be adjusted based on field and laboratory data, including COCs, COD, ORP, geochemical, and microbiological measurements. The rate of the injection will remain the same as the initial rate of injection at 3 percent sodium lactate in water solution and will be delivered at a rate of 4 gpm for 8 hours per day. This proposed additional lactate injection would continue to target the center of the plume where COC concentrations are the highest. The downgradient portion of the plume contains low COC concentrations. Assuming that significant contaminant mass is removed over

the next several months as anticipated, COCs at the plume boundaries would potentially be mitigated via system modifications and/or natural attenuation.

2) Continue to address downgradient COC migration in the vicinity of MW-40-07 through monitoring and inject lactate into newly installed injection wells IW-18 and -19, in order to apply treatment to this area. Regularly assess geochemical parameters in MW-40-07, and ORP in IW-18 and IW-19. Upon attaining sulfate-reducing conditions, and depending upon COC trends, consider bioaugmentation with KB-1 in this area. In addition, continue to assess contaminant migration in the vicinity of well MW-40-17 through monitoring. We propose collecting groundwater samples from MW-40-17 every other month for COCs analyses.

3) Reassess the status of the system in several months. Depending on the success in achieving and maintaining adequate substrate coverage and DHC populations, the extent of COC degradation, and COC migration in MW-40-07 and -17, it may be determined at that time that system adjustments are required. If so, strategic or focused groundwater recirculation scenarios, slow release substrate strategies, or alternative strategies would be evaluated and possibly implemented to enhance substrate distribution and/or achieve COC containment. This will be evaluated and considered based on the ability to maintain substrate coverage within key plume areas, the degree of success in achieving complete reductive dechlorination in all locations within the plume, the degree to which the bioaugmented KB-1 culture propagates/migrates, and COC monitoring in downgradient monitoring wells MW-40-07, MW-40-17, and other wells in the vicinity.

4) As stated in the Work Plan (TtEC, 2005), the list of analytical parameters will be refined as the project progressed based on review of the results to incorporate only analyses that yield useful data in monitoring the EISB process. In addition, it is stipulated that the sampling frequency would be on monthly basis for the first 3 months and quarterly for the remainder of the first year. We have continued to collect laboratory data on a monthly basis. Field data (using field analytical kits) were initially collected biweekly, but were reduced to monthly during October because they were not providing useful information toward performance assessment or for making operational adjustments. We will continue sampling for laboratory analysis on a monthly basis rather than quarterly, during the months of November 2005 through January 2006, due to the fact that the system is at a critical juncture, and afterward reduce the frequency to quarterly. However, we propose to eliminate the field kit analyses, as the monthly laboratory data are comprehensive, and adequate for performance assessment. It is noted that monthly sampling events for laboratory parameters will also include field analysis of DO, pH, ORP, temperature, and conductivity, using the flow-through cell field analyzer.

7.0 REFERENCES

American Society of Testing and Materials (ASTM). 2000. *Standard Practice for Analysis of Reformed Gas by Gas Chromatography*.

Bechtel National, Inc. (BNI). 1999. *Final Extended Removal Site Evaluation Report, Installation Restoration Sites 40 and 70, Naval Weapons Station Seal Beach, Seal Beach, California*. October.

Bechtel Environmental, Inc. (BEI). 2000. *Final Groundwater Feasibility Study Report for Installation Restoration Sites 40 and 70, Naval Weapons Station Seal Beach, Seal Beach, California*. June.

__________________. 2004. *Final Pilot Test Report for In Situ Enhanced Bioremediation at IRP Site 40, Naval Weapons Station Seal Beach, Seal Beach, California.* November.

California Department of Water Resources (DWR). 1961. *Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County*. Bulletin 104, Appendix A. June.

California Regional Water Quality Control Board (RWQCB), Santa Ana Region. 1995. *Water Quality Control Plan, Santa Ana River Basin.*

Cupples, A.M., A.M. Spormann, and P.L. McCarty. 2004. Vinyl chloride and cis-dichloroethene dechlorination kinetics and microorganism growth under substrate limiting conditions. *Environ Sci Technol*. 2004 Feb 15;38(4):1102-7.

Department of the Navy (DON). 2004. *Final Record of Decision/Remedial Action Plan, Operable Unit 4, IRP Site 40, Naval Weapons Station Seal Beach, Seal Beach, California.* May.

Freeze and Cherry. 1979. *Groundwater*. Englewood Cliffs, New Jersey: Prentice-Hall.

Jacobs Engineering Group, Inc. (JEG) 1994. *Draft Preliminary Assessment (PA) Report for the Research, Testing and Evaluation Area, Naval Weapons Station, Seal Beach, California.*

_______________. 1995. *Final Operable Unit 4 Site Inspection Report, Naval Weapons Station, Seal Beach, California.* October.

_______________. 1996. *Draft Final Operable Units 4 and 5 Focused Site Inspection Report, Naval Weapons Station, Seal Beach, California.* December 20.

Mallinckrodt Baker, Inc. 1999. Materials Safety Data Sheet for Sodium Lactates. Available at: http://www.jtbaker.com.

Southwest Division, Naval Facilities Engineering Command. 2001. *Environmental Work Instruction (EWI) #1, 3EN2.1, Chemical Data Validation*.

Soil Conservation Service (SCS). 1978. *Soil Survey of Orange County and Western Part of Riverside County, California*. U.S. Department of Agriculture.

Tetra Tech EC, Inc (TtEC). 2005. *Final Remedial Design/Work Plan. Enhanced In Situ Bioremediation Installation Restoration Program Site 40 (Concrete Pit/Gravel Area), Naval Weapons Station Seal Beach, Seal Beach, California.* February 24.

United States Environmental Protection Agency (EPA). 1986. *Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846*, Third Edition and final updates.

___________________. 1999a. *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air,* Second Edition and final updates.

___________________. 1999b. *National Functional Guidelines for Organic Data Review, EPA 540/R-99/008*.

___________________. 2004. *National Functional Guidelines for Inorganic Data Review, EPA 540/R-94/013*.

White, D.C. 1979. Lipid analysis of sediments for microbial biomass and community structure, 87-103. In C.D. Litchfield and P.L. Seyfreid (ed.), *Methodology for Biomass Determination and Microbial Activities in Sediments*, vol. ASTM STP 673. American Society of Testing and Materials, Philadelphia.

TABLES

TABLE 1-1

REMEDIATION GOALS FOR IRP SITE 40 GROUNDWATER (micrograms per liter)

Analyte	Federal Maximum Contaminant Level[a]	California Maximum Contaminant Level[b]	Controlling ARAR
cis-1,2-dichloroethene	70	6	6
trans-1,2-dichloroethene	100	10	10
Trichloroethene	5	5	5
Tetrachloroethene	5	5	5
Vinyl chloride	2	0.5	0.5

Notes:

[a] United States Environmental Protection Agency Safe Drinking Water Act, Title 40 Code of Federal Regulations, Part 141

[b] California Code of Regulations, Title 22, Section 64439, Requirements, and Section 64444, Maximum Contaminant Levels

ARAR – applicable or relevant and appropriate requirement
IRP – Installation Restoration Program

TABLE 3-1

LIST OF GROUNDWATER MONITORING WELLS, INJECTION WELLS, AND SOIL VAPOR/GAS MONITORING WELLS AND DETAILS

Well ID	Construction Date	Casing Diameter (inches)	Casing Material	Slot Size (inches)	Borehole Diameter (inches)	Top of Filter Pack (feet bgs)	Screen Interval (top) (feet bgs)	Screen Interval (bottom) (feet bgs)	Well Depth (feet bgs)
EXISTING WELLS INSTALLED DURING PREVIOUS INVESTIGATIONS AND PILOT TEST									
VW-40-01	3/19/2003	2	Sch. 40 PVC	0.01	8	2	2.5	7.5	8
VW-40-02	3/19/2003	2	Sch. 40 PVC	0.01	8	2	2.5	7.5	8
40-MW-01	12/22/1992	2	Sch. 40 PVC	0.01	8	4.0	6.5	16.5	20.0
40-MW-02	12/21/1992	2	Sch. 40 PVC	0.01	8	4.0	6.0	16.0	20.0
40-MW-03	12/21/1992	2	Sch. 40 PVC	0.01	8	4.0	6.5	16.5	19.0
40-MW-04	12/22/1992	2	Sch. 40 PVC	0.01	NA	4.0	6.0	16.0	18.0
40-MW-05	10/30/1995	2	Sch. 40 PVC	0.01	10	6.0	9.5	25.0	26.0
MW-40-06	8/26/1997	4	Sch. 40 PVC	0.01	10	16.3	20.3	30.3	34.0
MW-40-07	9/15/1997	4	Sch. 40 PVC	0.01	12	15.0	20.0	30.0	34.0
MW-40-08	9/12/1997	4	Sch. 40 PVC	0.01	12	13.5	20.0	30.0	34.0
MW-40-09	8/27/1997	4	Stainless Steel	0.01	12	40.0	45.0	55.0	57.0
MW-40-10	8/28/1997	4	Sch. 40 PVC	0.01	10	40.0	45.0	55.0	59.0
MW-40-11	9/5/1997	4	Stainless Steel	0.01	12	40.0	45.0	55.0	57.0
MW-40-12	9/11/1997	4	Sch. 40 PVC	0.01	12	40.0	45.0	55.0	59.0
MW-40-13	9/15/1997	4	Sch. 40 PVC	0.01	12	40.0	45.0	55.0	58.0
MW-40-14	9/8/1997	4	Sch. 40 PVC	0.01	12	25.0	30.0	40.0	59.0
MW-40-15	9/16/1997	4	Sch. 40 PVC	0.01	12	17.0	20.0	30.0	33.5
MW-40-16	9/16/1997	4	Sch. 40 PVC	0.01	12	34.0	42.3	52.3	57.5
MW-40-17	4/11/2000	4	Sch. 40 PVC	0.01	10	17.0	20.0	30.0	32.0
MW-40-18	4/12/2000	4	Sch. 40 PVC	0.01	10	47.0	50.0	60.0	62.0
MW-40-19	4/12/2000	4	Sch. 40 PVC	0.01	10	17.0	19.8	29.8	32.0
MW-40-20	4/13/2000	4	Sch. 40 PVC	0.01	10	47.0	49.7	59.7	62.0
MW-40-21	4/11/2000	4	Sch. 40 PVC	0.01	10	47.0	50.5	60.5	62.0
MW-40-22	7/6/2001	4	Sch. 40 PVC	0.01	11	12	15.3	35.5	35.7

TABLE 3-1

LIST OF GROUNDWATER MONITORING WELLS, INJECTION WELLS, AND SOIL VAPOR/GAS MONITORING WELLS AND DETAILS

Well ID	Construction Date	Casing Diameter (inches)	Casing Material	Slot Size (inches)	Borehole Diameter (inches)	Top of Filter Pack (feet bgs)	Screen Interval (top) (feet bgs)	Screen Interval (bottom) (feet bgs)	Well Depth (feet bgs)
MW-40-23	7/9/2001	4	Sch. 40 PVC	0.01	11	10.5	15.1	35.1	35.5
MW-40-24	7/9/2001	4	Sch. 40 PVC	0.01	11	12.9	15.1	35.1	35.5
MW-40-25	7/9/2001	4	Sch. 40 PVC	0.01	11	13	15.3	35.3	35.7
MW-40-26	7/6/2001	4	Sch. 40 PVC	0.01	11	12.5	15.2	35.2	35.6
MW-40-27	7/9/2001	4	Sch. 40 PVC	0.01	11	12.6	15.1	35.1	35.5
MW-40-28	7/9/2001	4	Sch. 40 PVC	0.01	11	11	15.0	35.0	35.4
MW-40-29	3/19/2003	4	Sch. 40 PVC	0.01	10	13	15.0	35.0	35.5
INJECTION, GROUNDWATER MONITORING, AND SOIL VAPOR/GAS MONITORING WELLS INSTALLED AS PART OF THE IN SITU BIOREMEDIATION									
IW-1	3/7/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-2	3/7/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-3	2/28/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-4	3/2/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-5 Existing Monitoring Well MW-40-27	7/9/2001	4	Sch. 40 PVC	0.01	11	12.6	15.1	35.1	35.5
IW-6	3/1/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-7	3/1/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-8	2/28/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-9	2/28/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-10	3/7/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-11	3/2/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-12	3/2/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-13	2/25/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-14	3/7/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-15	2/28/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0

TABLE 3-1

LIST OF GROUNDWATER MONITORING WELLS, INJECTION WELLS, AND SOIL VAPOR/GAS MONITORING WELLS AND DETAILS

Well ID	Construction Date	Casing Diameter (inches)	Casing Material	Slot Size (inches)	Borehole Diameter (inches)	Top of Filter Pack (feet bgs)	Screen Interval (top) (feet bgs)	Screen Interval (bottom) (feet bgs)	Well Depth (feet bgs)
IW-16	3/2/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-17	3/1/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
IW-18	8/19/2005	4	Sch. 40 PVC	0.01	10	12	14.0	34.0	35.0
IW-19	9/10/2005	4	Sch. 40 PVC	0.01	10	12	14.0	34.0	35.0
MW-40-30	2/28/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	35.0
MW-40-31	3/3/2005	4	Sch. 40 PVC	0.01	12	40	42.0	52.0	53.0
MW-40-32	2/28/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
MW-40-33	3/2/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
MW-40-34	3/1/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
MW-40-35	2/23/2005	4	Sch. 40 PVC	0.01	12	43	45.0	55.0	60.0
MW-40-36	2/24/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	36.0
MW-40-37	2/25/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
MW-40-38	3/4/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
MW-40-39	3/4/2005	4	Sch. 40 PVC	0.01	12	14	15.0	35.0	38.0
VW-40-3	3/4/2005	2	Sch. 40 PVC	0.01	10	2.5	3.0	10.0	10.0
VW-40-4	3/3/2005	2	Sch. 40 PVC	0.01	10	2.5	3.0	10.0	10.0
VW-40-5	3/3/2005	2	Sch. 40 PVC	0.01	10	2.5	3.0	10.0	10.0
VW-40-6	3/4/2005	2	Sch. 40 PVC	0.01	10	2.5	3.0	10.0	10.0

Notes:

bgs – below ground surface

NA – not available

PVC – polyvinyl chloride

Sch. – Schedule

TABLE 4-1

LIST OF MONITORING PARAMETERS

Analyte	Frequency	General Data Use
IN FIELD		
Nitrate	Baseline – Once Biweekly – for the first 6 months Monthly for the second 6 months Quarterly – After first year	Alternate electron accepter in anoxic respiration – reduced concentrations relative to control or baseline measurements indicates biological activity.
Sulfate	Baseline – Once Biweekly – for the first 6 months Monthly for the second 6 months Quarterly – After first year	Alternate electron accepter in anoxic respiration – reduced concentrations relative to control or baseline measurements indicates biological activity.
Ferrous Iron	Baseline – Once Biweekly – for the first 6 months Monthly for the second 6 months Quarterly – After first year	By-product of Fe(III) reduction – increased concentrations relative to control or baseline measurements indicates biological activity.
Carbon Dioxide	Baseline – Once Biweekly – for the first 6 months Monthly for the second 6 months Quarterly – After first year	Biogenic gas and alternate electron accepter – concentration variations relative to control or baseline measurements indicate biological activity.
Alkalinity	Baseline – Once Biweekly – for the first 6 months Monthly for the second 6 months Quarterly – After first year	Results from evolution of biogenic carbon dioxide, increases relative to control or baseline measurements indicate biological activity.
COD	Baseline – Once Biweekly – for the first 6 months Monthly for the second 6 months Quarterly – After first year	Used as a surrogate for TOC. Variations relative to control or baseline measurements indicate substrate presence/depletion.
pH	Baseline – Once Biweekly – for the first 6 months Monthly for the second 6 months Quarterly – After first year Semiannually – After first year (MNA Phase)	Values outside the general range of 6-8.5 can impede biological activity, decreases can result from production of organic acids during breakdown of lactate.

TABLE 4-1

LIST OF MONITORING PARAMETERS

Analyte	Frequency	General Data Use
Conductivity	Baseline – Once Biweekly – for the first 6 months Monthly for the second 6 months Quarterly – After first year Semiannually – After first year (MNA Phase)	General indicator of water quality varies directly with salinity.
ORP	Baseline – Once Biweekly – for the first 6 months Monthly for the second 6 months Quarterly – After first year Semiannually – After first year (MNA Phase)	Reflects the concentrations of oxidizers or reducers in groundwater, and their activity or strength. Provides an indication of dominant electron accepting processes that are likely to be occurring in the subsurface.
DO	Baseline – Once Biweekly – for the first 6 months Monthly for the second 6 months Quarterly – After first year Semiannually – After first year (MNA Phase)	Primary electron accepter – reduced concentrations relative to control or baseline measurements indicates biological activity.
Water level	Baseline – Once During lactate injection – As needed Monthly – First year Quarterly – After first year Semiannually – After first year (MNA Phase)	Used to assess groundwater flow and mounding.
Methane gas	Baseline – Once During lactate injection – As needed Monthly – First year Quarterly – After first year Each time well caps are removed	Biogenic gas indicating use of carbon dioxide as an electron acceptor under strongly reducing conditions – generally indicates biological activity (methanogenesis) under conditions which favor reductive dechlorination.
Hydrogen sulfide gas	Baseline – Once During lactate injection – As needed Monthly – First year Quarterly – After first year Each time well caps are removed	Biogenic gas in which SO_4^{2-} is used as an electron acceptor under strongly reducing conditions – generally indicates biological activity under conditions which favor reductive dechlorination.

TABLE 4-1

LIST OF MONITORING PARAMETERS

Analyte	Frequency	General Data Use
Total explosive gases	Baseline – Once During lactate injection – As needed Monthly – First year Quarterly – After first year Each time well caps are removed	Health and safety parameter.
	IN FIXED LABORATORY	
Alkalinity	Baseline – Once Monthly – first 6 months Quarterly – After the first 3 months Semiannually – After first year (MNA Phase)	An indicator of evolution of biogenic carbon dioxide, increases relative to control or baseline measurements indicate biological activity.
COD	Baseline – Once Monthly – first Year Quarterly – After the first 3 months Semiannually – After first year (MNA Phase)	Used as a surrogate for TOC. Variations relative to control or baseline measurements indicate substrate presence/depletion.
Dissolved gases (methane, carbon dioxide, hydrogen sulfide, hydrogen gas)	Baseline – Once Monthly – first 6 months Quarterly – After the first 3 months Semiannually – After first year (MNA Phase)	Biogenic gases – indicative of strongly reducing conditions – increases relative to control or baseline measurements generally indicate biological activity under conditions that favor reductive dechlorination.
Q-PCR – DNA testing	Baseline – Once Monthly – first 6 months Bi-monthly – After the first 6 months Semiannually – After first year (MNA Phase)	Provides measurement of specific microorganisms and/or groups of organisms.
Major anions (sulfate, chloride, nitrate, nitrite)	Baseline – Once Monthly – first 6 months Quarterly – After the first 6 months Semiannually – After first year (MNA Phase)	Alternate electron accepters (excluding chloride) – reduced concentrations relative to control or baseline measurements indicates biological activity and oxidation/reduction status.
Major cations (Ca, Fe, Mg, Mn, K, Na)	Baseline – Once Monthly – first 3 months Quarterly – After the first 6 months Semiannually – After first year (MNA Phase)	General water quality parameters – increased Na relative to control or baseline measurements can indicate lactate migration; increased Fe and Mn relative to control or baseline measurements can indicate use of Fe(III) and Mn(IV) as terminal electron acceptors.
Organic acids	Baseline – Once Monthly – first 6 months Bi-monthly – After the first 6 months Semiannually – After first year (MNA Phase)	Formed in biodegradation of lactate, increased levels relative to control or baseline measurements can indicate lactate migration/breakdown.

TABLE 4-1

LIST OF MONITORING PARAMETERS

Analyte	Frequency	General Data Use
Phospholipid fatty acid	Baseline – Once Monthly – First 6 months Bi-monthly – After the first 6 months Semiannually – After first year (MNA Phase)	Provides quantitative information on overall biomass content and community diversity. Used to assess changes in microbial growth and community structure in response to substrate emplacement.
TDS	Baseline – Once Monthly – First 6 months Quarterly – After the first 6 months Semiannually – After first year (MNA Phase)	General water quality parameter – increases relative to control or baseline measurements can indicate lactate migration.
TOC	Baseline – Once Monthly – First 6 months Quarterly – After the first 6 months Semiannually – After first year (MNA Phase)	Will include lactate (among other organic compounds present), variations relative to control or baseline measurements indicate substrate presence/depletion.
VOC	Baseline – Once Monthly – First 6 months Quarterly – After the first 6 months Semiannually – After first year (MNA Phase)	Assessment of primary COCs and daughter products.
Fixed gases in vapor (methane, ethane, ethene)	Baseline – Once Monthly – First year Quarterly – After the first 3 months	Increases in methane concentrations relative to baseline or control will provide evidence of bioactivity under conditions that favor reductive dechlorination. Increases in ethane and ethene concentrations relative to baseline or control will provide evidence of complete reductive dechlorination.
VOC in vapor	Baseline – Once Monthly – First 6 months Quarterly – After the first 6 months Semiannually – After first year (MNA Phase)	Provides information regarding volatilization of primary COCs and/or daughter products from the groundwater, increases in daughter products relative to baseline or control measurements will provide evidence of reductive dechlorination.

Notes:

COC – chemical of concern
COD – chemical oxygen demand
DNA – deoxyribonucleic acid
DO – dissolved oxygen
Fe(III) – ferric iron
Mn(IV) – manganese (IV)
MNA – monitored natural attenuation
ORP – oxidation/reduction potential
Q-PCR – quantitative polymerase chain reaction
SO_4^{2-} – sulfate
TDS – total dissolved solids
TOC – total organic carbon
VOC – volatile organic compound

TABLE 4-2

DETAILS OF BASELINE MONITORING EVENT

Date	Event	Wells Sampled	Analytes[1]/Parameters	Notes
From: 3/21/05 To: 3/28/05	Scheduled initial baseline analysis	Groundwater: MW-40-01, 02, 06, 07, 08, 10, 11, 13, 14, 15, 17, 18, 19, 20, 22, 30-39 Soil Vapor: IW-1, 3, and 7, VW-40-01, 02, 03, 04, 05, 06, MW-40-31 and 34	VOCs, cations, microbial parameters, soil vapor, water levels, COD, SO_4^{2-} Fe(II), CO_2, Alkalinity, and NO^{3-}, alternate electron acceptors, metabolic byproducts, additional geochemical parameters, and soil vapor parameters.	Laboratory and field analysis of groundwater samples; soil vapor samples.

Notes:

[1]A complete list of parameters is provided in Table 4-1.
CO_2 – carbon dioxide
COD – chemical oxygen demand
Fe(II) – ferrous iron
NO^{3-} – nitrate
SO_4^{2-} – sulfate
VOC – volatile organic compound

TABLE 4-3

MONITORED PARAMETERS DURING AND FOLLOWING ROUND 1 LACTATE INJECTION PERIOD

Date	Event	Wells Sampled	Analytes[1]/Parameters	Notes
From: 4/04/05 To: 4/05/05	Interim field sampling	Groundwater: MW-40-14, 22, 30-39	COD	Initial assessment of lactate migration
From: 4/11/05 To: 4/12/05	Scheduled biweekly field parameter sampling/analysis	Groundwater: MW-40-02, 14, 22, 30-38	COD, SO_4^{2-} Fe(II), CO_2, alkalinity, and NO_3^-	Field analysis of groundwater samples
4/11/05	Additional microbiological testing	IW-5	Q-PCR for DHC	At the DON's request, to check for viability of previously bioaugmented cultures
4/15/05	Additional field testing for COD	IW-7 injector, IW-15 injector, and IW-15	COD	Assessment of lactate in groundwater in previously bioaugmented well and well experiencing injection difficulties (laboratory and field test)
4/04/05 4/11/05 4/18/05	Water levels	MW-40-01, 02, 06, 07, 08, 10, 11, 13, 14, 15, 17, 18, 19, 20, 22, 30-39, IW-1 and 2-17	NA	Assessment of mounding due to injection
From: 4/25/05 To: 5/02/05	Scheduled monthly laboratory and field parameter sampling/analysis	Groundwater: MW-40-02, 14, 22, 30-39 Soil Vapor: IW-1, 3, and 7, VW-40-01, 02, 03, 04, 05, 06, MW-40-31 and 34	VOCs, metals, microbial parameters, soil vapor, water levels, COD, SO_4^{-2}, Fe(II), CO_2, alkalinity, and NO_3^- additional geochemical parameters	
5/3/05	Additional groundwater sampling	MW-40-07	VOCs, COD	
5/4/05	COD Retest	MW-40-14, 33, 34, 36, 37, 30, 38, 39	COD	
From: 5/10/05 To: 5/12/05	Scheduled biweekly field parameter sampling/analysis	MW-40-22, 14, 33, 34, 35, 36, 37, 39, 31, 30, 32, 38, 40-MW-02, and IW-7 injector	COD, SO_4^{2-} Fe(II), CO_2, alkalinity, and NO_3^-	Field analysis of groundwater samples
From: 5/24/05 To: 5/31/05	Scheduled monthly laboratory and field parameter sampling/analysis	Groundwater: MW-40-02, 14, 22, 30-39, 07 Soil Vapor: IW-1, 3, and 7, VW-40-01, 02, 03, 04, 05, 06, MW-40-31 and 34	VOCs, cations, microbial parameters, soil vapor, water levels, COD, SO_4^{-2}, Fe(II), CO_2, alkalinity, and NO_3^- additional geochemical parameters	

TABLE 4-3

MONITORED PARAMETERS DURING AND FOLLOWING ROUND 1 LACTATE INJECTION PERIOD

Date	Event	Wells Sampled	Analytes[1]/Parameters	Notes
6/08/05	Additional groundwater sampling downgradient of MW-40-07	HP-1, HP-2, HP-3, HP-4, HP-5	VOCs, COD, field parameters	Laboratory and field analysis of groundwater samples
6/09/05	Scheduled biweekly field parameter sampling/analysis	MW-40-02, -06, -07, -08, -10, -11, -13, -14, -15, -17, -19, -20, –22, and -30 through -39	COD, SO_4^{2-} Fe(II), CO_2, alkalinity, and NO_3^-	Field analysis of groundwater samples
From: 6/24/05 To: 7/06/05	Scheduled monthly and MNA laboratory and field parameter sampling/analysis	Groundwater: MW-40-02, -06, -07, -08, -10, -11, -13, -14, -15, -17, -19, -20, -22, and -30 through -39 Soil Vapor: VW-1 through VW-6, IW-1, IW-3, IW-7, MW-40-31, and MW-40-34	VOCs, cations, microbial parameters, soil vapor, water levels, COD, SO_4^{-2}, Fe(II), CO_2, alkalinity, and NO_3^- additional geochemical parameters	Currently ongoing, will be summarized in the next monthly summary
7/28/05	Soil vapor monitoring	VW-40-01 through –06, probes in IW-1 through -4, IW-6, through 17, and probes in MW-40-31 through -39	Methane, oxygen, H_2S, CO_2, and VOCs	
7/27/05	Gas emissions in Buildings 240 and 239, and in pavement cracks around and in the vicinity of the buildings	NA	Methane	
7/26/05	Groundwater level measurements	Groundwater: MW-40-06, -10, -14, -20, -22, and -30 through –39, and IW-1 though -17	NA	
From: 7/05/05 To: 7/06/05	Additional groundwater sampling/analysis of injection wells	IW-6, -7, -8, -9, -12, -13, -14, -17	VOCs, cations, microbial parameters, soil vapor, water levels, COD, SO_4^{-2}, Fe(II), CO_2, alkalinity, and NO_3^- additional geochemical parameters	Conducted following the prior monthly monitoring event
From: 7/13/05 To: 7/14/05	Scheduled biweekly field parameter sampling/analysis	MW-40-02, -07, -14, –22, and -30 through -39	COD, SO_4^{2-} Fe(II), CO_2, alkalinity, and NO_3^-	Field analysis of groundwater samples
From: 7/26/05 To: 8/01/05	Scheduled monthly and MNA laboratory and field parameter sampling/analysis	Groundwater: MW-40-02, -07, -14, -22, and -30 through -39 Soil Vapor: VW-1 through VW-6, IW-1, IW-3, IW-7, MW-40-31, and MW-40-34	VOCs, cations, microbial parameters, soil vapor, water levels, COD, SO_4^{-2}, Fe(II), CO_2, Alkalinity, and NO_3^- additional geochemical parameters, soil vapor parameters	Currently ongoing, will be summarized in the next monthly summary

TABLE 4-3

MONITORED PARAMETERS DURING AND FOLLOWING ROUND 1 LACTATE INJECTION PERIOD

Notes:

CO_2 – carbon dioxide
COD – chemical oxygen demand
DHC – *Dehalococcoides ethenogenes* spp.
DON – Department of the Navy
Fe(II) – ferrous iron
MNA – monitored natural attenuation
NA – not available
NO_3^- – nitrate
Q-PCR – quantitative polymerase chain reaction
SO_4^{2-} – sulfate
VOC – volatile organic compound

[1]A complete list of parameters is provided in Table 4-1.

TABLE 4-4

MONITORED PARAMETERS DURING AND FOLLOWING ROUND 2 LACTATE INJECTION PERIOD

Date	Event	Wells Sampled	Analytes[1]/Parameters	Notes
From: 8/09/05 To: 8/10/05	Scheduled biweekly field parameter sampling/analysis	MW-40-02, -07, -14, –22, and -30 through -39	COD, SO_4^{2-} Fe(II), CO_2, alkalinity, and NO_3^-, DO, ORP	Field analysis of groundwater samples
8/23/05	Gas emissions in Buildings 240 and 239, and in pavement cracks around and in the vicinity of the buildings	NA	Methane	
8/22/05	Groundwater level measurements	Groundwater: MW-40-06, -10, -14, -20, -22, and -30 through –39, and IW-1 though -17	NA	
From: 8/22/05 To: 8/25/05	Scheduled monthly laboratory and field parameter sampling and analysis	Groundwater: MW-40-02, -07, -14, -22, and -30 through –39, new injection well (IW-18) Soil Vapor: VW-1 through VW-6, IW-1, IW-3, IW-7, MW-40-31, and MW-40-34	VOCs, cations, microbial parameters, soil vapor, water levels, COD, SO_4^{-2}, Fe(II), CO_2, alkalinity, and NO_3^- additional geochemical parameters, soil vapor parameters IW-18: VOCs, field parameters; wells 7 and 39, VOCs, selected geochemical parameters, and field parameters	Currently ongoing, will be summarized in the next monthly summary
8/23/05	Monthly soil gas probe monitoring	VW-01 through VW-06, probes in IW-01 through IW-04, IW-06 through IW-17, and probes in groundwater monitoring wells MW-40-32 through MW-40-39	Methane, hydrogen sulfide, oxygen, carbon dioxide, and VOCs	Field testing of the soil gas in probes using field testing equipment (Landtec GEM 500)
9/12/05	Baseline testing of new injection well	IW-19	VOCs, DNA	NA
From: 9/15/05 To: 9/16/05	Scheduled biweekly field parameter sampling/analysis	MW-40-02, -07, -14, –22, and -30 through -39	COD, SO_4^{2-}, Fe(II), CO_2, alkalinity, and NO_3^-, DO, ORP	Field analysis of groundwater samples
9/12/05	Gas emissions in Buildings 240 and 239, and in pavement cracks around and in the vicinity of the buildings	NA	Methane	
9/14/05	Investigation of ORP meter malfunction	IW-6 and MW-40-14	ORP	Original meter found to be defective
From: 9/16/05 To: 9/20/05	Bioaugmentation with KB-1 culture	IW-3, -6, -7, -8, -9, -10, -12, -13, -14, -15	NA	NA

TABLE 4-4

MONITORED PARAMETERS DURING AND FOLLOWING ROUND 2 LACTATE INJECTION PERIOD

Date	Event	Wells Sampled	Analytes[1]/Parameters	Notes
From: 9/26/05 To: 10/03/05	Scheduled monthly laboratory and field parameter sampling and analysis	Groundwater: MW-40-02, -07, -14, -22, and -30 through –39, new injection well (IW-18) Soil Vapor: VW-1 through VW-6, IW-1, IW-3, IW-7, MW-40-31, and MW-40-34	VOCs, cations, microbial parameters, soil vapor, water levels, COD, SO_4^{-2}, Fe(II), CO_2, alkalinity, and NO_3^- additional geochemical parameters, soil vapor parameters IW-18: VOCs, field parameters; wells 7 and 39, VOCs, selected geochemical parameters, and field parameters	Currently scheduled for these dates, will be summarized in the next monthly summary
From: 9/26/05 To: 9/30/05	Scheduled monthly laboratory and field parameter sampling and analysis	Groundwater: MW-40-01, -02, -06, -07, -08, -10, -11, -13, -14 -15, -17, -19, -20, -22, and -30 through –39	VOCs, cations, microbial parameters, soil vapor, water levels, COD, SO_4^{2-}, Fe(II), CO_2, alkalinity, and NO_3^- additional geochemical parameters IW-18: VOCs, field parameters; wells 7 and 39, VOCs, selected geochemical parameters, and field parameters	
10/11/05	Monthly soil vapor testing	Soil Vapor: VW-1 through VW-6, IW-1, IW-3, IW-7, MW-40-31, and MW-40-34	Soil vapor parameters	
From: 10/13/05 To: 10/18/05	Field parameter sampling and analytical field kit	Groundwater: MW-40-02, -07, -14, -22, and -30 through -39	COD, SO_4^{2-}, Fe(II), CO_2, alkalinity, and NO_3^-, additional geochemical parameters	
10/19/05	Waste and selected well testing	Solid waste, wastewater, HP-1 through -3.	Waste: VOCs and metals; HP-1 through -3, VOCs	
10/24 – 10-26	Scheduled monthly laboratory and field parameter sampling and analysis	Groundwater: MW-40-02, -07, -14, -22, and -30 through –39, IW-6, -9, -13, -14	VOCs, cations, DNA, soil vapor, water levels, COD, SO_4^{2-}, Fe(II), CO_2, alkalinity, and NO_3^- additional geochemical parameters, IW-6: VOCs only IW-9, -13, -14: VOCs and DNA	Note that field test kits (COD, SO_4^{2-}, Fe(II), CO_2, alkalinity, NO_3^-) were not conducted
10/31	Soil vapor sampling	VW-40-01 through -06, MW-40-34, IW-1, -3, -7	VOCs and fixed gasses	

Notes:

CO_2 – carbon dioxide
COD – chemical oxygen demand
DNA – deoxyribonucleic acid
DO – dissolved oxygen
Fe(II) - ferrous iron
NA – not available
NO_3^- - nitrate
ORP – oxidation/reduction potential
Q-PCR – quantitative polymerase chain reaction
SO_4^{2-} - sulfate
VOC – volatile organic compound

[1]A complete list of parameters is provided in Table 4-1.

TABLE 5-1

SUMMARY OF LABORATORY ANALYTICAL RESULTS – COCS AND BREAKDOWN COMPOUNDS

Location	Sample No.	Sample Date	PCE µg/L	TCE µg/L	cis-1,2-DCE µg/L	Chloride µg/L	Ethene µg/L
BAKER TANK	90-038	03/28/05	38	3.7	4.8	0.5 U	NA
HydroPunch - Temporary Monitoring Wells							
HP-1	90-085	06/08/05	1 U	1 U	1 U	0.5 U	4
HP-2	90-082	06/08/05	1 U	1 U	1 U	0.5 U	2.2
HP-3	90-083	06/08/05	1 U	1 U	1 U	0.5 U	2.6
HP-4	90-084	06/08/05	1 U	1 U	1 U	0.5 U	2.7
HP-5	90-081	06/08/05	1 U	1 U	1 U	0.5 U	2
Injection Wells							
IW-6	90-129	07/06/05	2	2.8	560	20	15
	90-170	08/30/05	29	31	270	6.1	0.67 J
IW-7	90-128	07/06/05	1 U	1 U	520	0.5 U	1 J
IW-8	90-122	07/05/05	0.25 J	0.25 J	97	0.26 J	2.3
	90-171	08/30/05	0.3 J	0.22 J	11	0.48 J	1.2 U
IW-9	90-120	07/05/05	0.68 J	0.71 J	43	7.1	4.1
	90-121 (FD)	07/05/05	0.69 J	0.73 J	41	7.3	NA
IW-12	90-127	07/06/05	1 U	1 U	55	0.5 U	1.2 J
IW-13	90-125	07/05/05	1 U	1 U	160	11	2.2
	90-172	08/30/05	6.5	7.5	280	11	3.7
IW-14	90-123	07/05/05	1 U	1 U	150	2.3	1.9
IW-17	90-124	07/05/05	0.55 J	1 U	1 U	0.5 U	0.63 J
IW-18	90-158	08/23/05	150	3.1	1.1	0.92	2.1
Groundwater Monitoring Wells							
MW-40-01	90-026	03/25/05	1.9	1 U	1 U	0.5 U	1.2 U
	90-111	06/30/05	1.9	1 U	1 U	0.5 U	1.2 U
	90-205	09/30/05	1.9	1 U	1 U	0.5 U	1.2 U
MW-40-02	90-027	03/25/05	11	1.3	0.97 J	0.5 U	1.2 U
	90-058	04/27/05	13	1.3	0.65 J	0.5 U	1.2 U
	90-075	05/26/05	11	1.1	0.41 J	0.5 U	1.2 U
	90-112	06/30/05	15	1.4	0.39 J	0.5 U	1.2 U
	90-145	07/29/05	11	0.57 J	1 U	0.5 U	1.2 U
	90-162	08/23/05	7.3	0.45 J	1 U	0.5 U	1.2 U
	90-163 (FD)	08/23/05	7.9	0.49 J	1 U	0.5 U	NA
	90-206	09/30/05	9.6	0.56 J	1 U	0.5 U	1.2 U
MW-40-06	90-002	03/21/05	0.21 J	1 U	1 U	0.5 U	1.2 U
	90-003 (FD)	03/21/05	0.22 J	1 U	1 U	0.5 U	NA
	90-087	06/27/05	9	1 U	1 U	0.5 U	1.2 U
	90-088 (FD)	06/27/05	9.1	1 U	1 U	0.5 U	NA
	90-177	09/26/05	2.1	1 U	1 U	0.5 U	1.2 U
MW-40-07	90-013	03/23/05	48	0.76 J	1 U	0.5 U	1.2 U
	90-060	05/03/05	62	1 J	1 U	0.5 U	NA
	90-079	05/26/05	55	0.89 J	1 U	0.5 U	1.2 U
	90-108	06/30/05	68	1.5	0.26 J	0.5 U	1.2 U
	90-147	07/29/05	86	1.7	1 U	0.5 U	1.2 U
	90-159	08/23/05	63	1.3	0.24 J	0.5 U	1.2 U
	90-200	09/29/05	110	1.7	0.23 J	0.5 U	1.2 U
MW-40-08	90-018	03/24/05	7.3	1.2	0.22 J	0.5 U	1.2 U
	90-103	06/29/05	10	1.9	0.34 J	0.5 U	1.2 U
	90-194	09/28/05	7.5	1.4	0.21 J	0.5 U	1.2 U
MW-40-10	90-001	03/21/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-086	06/27/05	0.21 J	1 U	1 U	0.5 U	1.2 U
	90-176	09/26/05	1 U	1 U	1 U	0.5 U	1.2 U
MW-40-11	90-024	03/25/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-025 (FD)	03/25/05	1 U	1 U	1 U	0.5 U	NA
	90-118	07/01/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-203	09/29/05	1 U	1 U	1 U	0.5 U	1.2 U

TABLE 5-1

SUMMARY OF LABORATORY ANALYTICAL RESULTS – COCS AND BREAKDOWN COMPOUNDS

Location	Sample No.	Sample Date	PCE µg/L	TCE µg/L	cis-1,2-DCE µg/L	Chloride µg/L	Ethene µg/L
MW-40-13	90-014	03/23/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-116	07/01/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-201	09/29/05	1 U	1 U	1 U	0.5 U	1.2 U
MW-40-14	90-005	03/22/05	300	4.7	3.2	0.5 U	1.2 U
	90-043	04/26/05	68	30	70	0.38 J	1.2 U
	90-063	05/24/05	10	3.6	150	0.62	1.2 U
	90-090	06/27/05	55	13	180	2.3	1.2 U
	90-132	07/26/05	100	23	74	14	2.8
	90-151	08/22/05	14	3.2	80	13	3.6
	90-179	09/26/05	2.4	2	70	7	3.4
MW-40-15	90-016	03/24/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-106	06/30/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-196	09/28/05	0.26 J	0.26 J	1 U	0.5 U	1.2 U
MW-40-17	90-017	03/24/05	0.51 J	1 U	1 U	0.5 U	1.2 U
	90-104	06/29/05	0.51 J	1 U	1 U	0.5 U	1.2 U
	90-195	09/28/05	16	0.21 J	1 U	0.5 U	1.2 U
MW-40-19	90-012	03/23/05	0.46 J	1 U	1 U	0.5 U	1.2 U
	90-095	06/28/05	1.4	1 U	1 U	0.5 U	1.2 U
	90-181	09/27/05	1.2	1 U	1 U	0.5 U	1.2 U
MW-40-20	90-011	03/23/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-115	07/01/05	0.41 J	1 U	1 U	0.5 U	1.2 U
	90-182	09/27/05	0.37 J	0.47 J	1 U	0.5 U	1.2 U
	90-183	09/27/05	0.39 J	0.45 J	1 U	0.5 U	NA
MW-40-22	90-004	03/22/05	1 U	1.5	2.4	0.5 U	1.1 J
	90-042	04/25/05	1 U	2.7	3	1.9	1.2
	90-062	05/24/05	1 U	1.9	2.3	1.3	1.2 J
	90-089	06/27/05	1 U	1.2	2.2	1.6	1 J
	90-131	07/26/05	1 U	1	1.6	1.9	1.3
	90-150	08/22/05	1 U	0.53 J	1.5	1	0.92 J
	90-178	09/26/05	1 U	0.44 J	1.4	1.1	0.81 J
MW-40-30	90-022	03/24/05	120	48	36	0.5 U	1.2 J
	90-050	04/27/05	130	48	31	0.5 U	1.4
	90-070	05/25/05	140	48	33	0.5 U	1.4
	90-100	06/29/05	19	15	190	0.5 U	2.4
	90-140	07/27/05	77	39	130	0.5 U	2.6
	90-166	08/24/05	92	34	81	0.5 U	1.4
	90-190	09/28/05	160	42	45	0.5 U	1.5
MW-40-31	90-020	03/24/05	6	0.71 J	0.49 J	0.5 U	0.75 J
	90-021 (FD)	03/24/05	4.6	0.53 J	0.39 J	0.5 U	NA
	90-051	04/27/05	24	3.2	5.2	0.5 U	1 J
	90-071	05/25/05	31	4.6	8.4	0.5 U	1.5
	90-117	07/01/05	32	4.8	13	0.5 U	1.7
	90-141	07/27/05	14	4	13	0.5 U	1.8
	90-142 (FD)	07/27/05	16	4.5	14	0.5 U	NA
	90-167	08/24/05	0.59 J	0.95 J	18	0.28 J	1.4
	90-191	09/28/05	1 U	0.34 J	13	2.6	0.92 J
	90-192	09/28/05	1 U	0.37 J	14	2.9	NA
MW-40-32	90-019	03/24/05	58	28	31	0.5 U	1.7
	90-052	04/27/05	73	36	40	0.5 U	0.8 J
	90-072	05/25/05	110	48	54	0.5 U	1.2 U
	90-101	06/29/05	4	1.9	150	0.5 U	0.98 J
	90-102 (FD)	06/29/05	3.8	2	150	0.5 U	NA
	90-143	07/27/05	2.1	0.84 J	130	0.5 U	1.1 J
	90-168	08/24/05	1.7	1.6	160	9.6	0.84 J
	90-193	09/28/05	1.5	0.94 J	120	9.5	1.2 U

TABLE 5-1

SUMMARY OF LABORATORY ANALYTICAL RESULTS – COCS AND BREAKDOWN COMPOUNDS

Location	Sample No.	Sample Date	PCE µg/L	TCE µg/L	cis-1,2-DCE µg/L	Chloride µg/L	Ethene µg/L
MW-40-33	90-010	03/23/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-044	04/26/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-064	05/24/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-091	06/27/05	1 U	1 U	1 U	0.5 U	0.69 J
	90-133	07/26/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-152	08/22/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-184	09/27/05	1 U	1 U	1 U	0.5 U	1.2 U
MW-40-34	90-009	03/23/05	9.1	1 U	1 U	0.5 U	1.2 U
	90-045	04/26/05	140	1.2	1 U	0.5 U	1.2 U
	90-065	05/24/05	180	1.6	0.24 J	0.5 U	1.2 U
	90-094	06/28/05	5.8	1.3	130	0.5 U	1.1 J
	90-134	07/26/05	6.8	2.1	130	0.5 U	0.8 J
	90-153	08/22/05	150	5	20	0.5 U	1.2 U
	90-154 (FD)	08/22/05	190	4.9	18	0.5 U	NA
	90-185	09/27/05	190	12	65	0.5 U	0.69 J
MW-40-35	90-006	03/22/05	110	2.1	1.9	0.5 U	1.6
	90-046	04/26/05	140	4.4	7.6	0.5 U	0.78 J
	90-066	05/26/05	73	3.6	13	0.5 U	1.2 U
	90-114	07/01/05	58	5.2	27	0.5 U	1.2 U
	90-135	07/26/05	56	4.4	19	0.5 U	1.2 U
	90-155	08/22/05	26	2.9	20	0.5 U	1.2 U
	90-186	09/27/05	33	4.8	24	0.5 U	1.2 U
MW-40-36	90-007	03/22/05	110	13	11	0.5 U	2.2
	90-047	04/26/05	300	28	22	0.5 U	1.2 U
	90-067	05/25/05	310	25	18	0.5 U	1.2 U
	90-098	06/29/05	300	34	49	0.5 U	1.2 U
	90-137	07/27/05	310	28	28	0.5 U	1.2 U
	90-138 (FD)	07/27/05	310	28	29	0.5 U	NA
	90-157	08/23/05	200	16	14	0.5 U	1.2 U
	90-187	09/27/05	190	14	13	0.5 U	1.2 U
MW-40-37	90-008	03/22/05	250	12	5	0.5 U	1.5
	90-048	04/26/05	330	12	4.9	0.5 U	3.7
	90-068	05/25/05	190	63	110	0.5 U	4.6
	90-099	06/29/05	15	16	280	0.5 U	5.7
	90-139	07/27/05	140	72	170	0.5 U	5
	90-161	08/23/05	170	56	100	0.5 U	4.1
	90-188	09/27/05	370	53	79	0.5 U	3.5
MW-40-38	90-023	03/25/05	0.56 J	1 U	1 U	0.5 U	0.99 J
	90-053	04/27/05	0.62 J	1 U	1 U	0.5 U	1.1 J
	90-054 (FD)	04/27/05	0.66 J	1 U	1 U	0.5 U	NA
	90-073	05/26/05	0.61 J	1 U	1 U	0.5 U	1.6
	90-074 (FD)	05/26/05	0.62 J	1 U	1 U	0.5 U	NA
	90-109	06/30/05	0.97 J	1 U	1 U	0.5 U	1.2 U
	90-110 (FD)	06/30/05	0.93 J	1 U	1 U	0.5 U	NA
	90-146	07/29/05	0.6 J	1 U	1 U	0.5 U	1.2 U
	90-165	08/24/05	0.75 J	1 U	1 U	0.5 U	1.2 U
	90-202	09/29/05	0.92 J	1 U	1 U	0.5 U	1.2 U
MW-40-39	90-015	03/23/05	1 U	1 U	1 U	0.5 U	0.69 J
	90-049	04/28/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-069	05/26/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-107	06/30/05	1 U	1 U	1 U	0.5 U	1.2 U
	90-148	07/29/05	0.34 J	1 U	1 U	0.5 U	1.2 U
	90-160	08/23/05	0.29 J	1 U	1 U	0.5 U	1.2 U
	90-198	09/29/05	0.34 J	1 U	1 U	0.5 U	1.2 U
	90-199	09/29/05	0.35 J	1 U	1 U	0.5 U	NA

TABLE 5-1

SUMMARY OF LABORATORY ANALYTICAL RESULTS – COCS AND BREAKDOWN COMPOUNDS

Location	Sample No.	Sample Date	PCE µg/L	TCE µg/L	cis-1,2-DCE µg/L	Chloride µg/L	Ethene µg/L
TRIP BLANK	90-028	03/21/05	1 U	1 U	1 U	0.5 U	NA
	90-029	03/22/05	1 U	1 U	1 U	0.5 U	NA
	90-030	03/23/05	1 U	1 U	1 U	0.5 U	NA
	90-031	03/24/05	1 U	1 U	1 U	0.5 U	NA
	90-032	03/25/05	1 U	1 U	1 U	0.5 U	NA
	90-055	04/25/05	1 U	1 U	1 U	0.5 U	NA
	90-056	04/26/05	1 U	1 U	1 U	0.5 U	NA
	90-057	04/27/05	1 U	1 U	1 U	0.5 U	NA
	90-059	04/28/05	1 U	1 U	1 U	0.5 U	NA
	90-061	05/03/05	1 U	1 U	1 U	0.5 U	NA
	90-076	05/24/05	1 U	1 U	1 U	0.5 U	NA
	90-077	05/25/05	1 U	1 U	1 U	0.5 U	NA
	90-078	05/26/05	1 U	1 U	1 U	0.5 U	NA
	90-080	06/08/05	1 U	1 U	1 U	0.5 U	NA
	90-092	06/27/05	1 U	1 U	1 U	0.5 U	NA
	90-093	06/28/05	1 U	1 U	1 U	0.5 U	NA
	90-097	06/29/05	1 U	1 U	1 U	0.5 U	NA
	90-105	06/30/05	1 U	1 U	1 U	0.5 U	NA
	90-113	07/01/05	1 U	1 U	1 U	0.5 U	NA
	90-119	07/05/05	1 U	1 U	1 U	0.5 U	NA
	90-126	07/06/05	1 U	1 U	1 U	0.5 U	NA
	90-130	07/26/05	1 U	1 U	1 U	0.5 U	NA
	90-136	07/27/05	1 U	1 U	1 U	0.5 U	NA
	90-144	07/29/05	1 U	1 U	1 U	0.5 U	NA
	90-149	08/22/05	1 U	1 U	1 U	0.5 U	NA
	90-156	08/23/05	1 U	1 U	1 U	0.5 U	NA
	90-164	08/24/05	1 U	1 U	1 U	0.5 U	NA
	90-169	08/30/05	1 U	1 U	1 U	0.5 U	NA
	90-175	09/26/05	1 U	1 U	1 U	0.5 U	NA
	90-180	09/27/05	1 U	1 U	1 U	0.5 U	NA
	90-189	09/28/05	1 U	1 U	1 U	0.5 U	NA
	90-197	09/29/05	1 U	1 U	1 U	0.5 U	NA
	90-204	09/30/05	1 U	1 U	1 U	0.5 U	NA

Notes:

µg/L - micrograms per liter
cis-1,2-DCE - cis-1,2-dichloroethene
COC - chemical of concern
FD - field duplicate
J - estimated value
NA - not available
PCE - tetrachloroethene
TCE - trichloroethene
U - not detected at or below the reporting limit

TABLE 5-2

SUMMARY OF LABORATORY ANALYSIS RESULTS – COCS AND DEGRADATION BY-PRODUCT GASSES IN SOIL VAPOR SAMPLES

Sample Location	Sample Number	Sample Date	PCE µg/m^3	TCE µg/m^3	cis-1,2-DCE µg/m^3	VC µg/m^3	Ethene ppmv	Ethane ppmv	Methane ppmv	CO_2 ppmv
Soil Vapor/Gas Monitoring Wells										
VW-40-01	90-509	3/28/2005	4,300	1,500	9,900	8,300	10 U	10 U	779,901	203,363
	90-515	5/2/2005	19,600	1,900	11,600	8,600	10 U	10 U	778,427	215,538
	90-532	5/31/2005	4,500	1,900	11,900	7,700	10 U	10 U	811,000	221,247
	90-535	6/28/2005	5,000	2,900	13,100	7,900	10 U	10 U	711,482	215,932
	90-546	8/2/2005	2,200	1,700	13,500	10,400	10 U	10 U	679,181	201,245
	90-556	8/30/2005	2,800	2,400	14,500	8,600	10 U	10 U	609,144	221,140
	90-576	10/11/2005	5400	3800	21100	8800	10 U	10 U	683,960	318,571
VW-40-02	90-510	3/28/2005	4,100	1,500	7,200	4,800	10 U	10 U	705,945	234,010
	90-516	5/2/2005	13,300	2,800	7,000	5,000	10 U	10 U	660,325	206,878
	90-517 (FD)	5/2/2005	12,000	2,700	7,100	4,600	10 U	10 U	658,791	202,594
	90-533	5/31/2005	8,200	4,000	9,300	6,900	10 U	10 U	767,444	256,324
	90-536	6/28/2005	6,400	4,000	8,900	7,500	10 U	10 U	730,306	261,653
	90-547	8/2/2005	4,200	3,700	8,200	8,600	10 U	10 U	621,650	232,426
	90-548 (FD)	8/2/2005	4,100	3,400	8,000	8,800	10 U	10 U	658,492	234,784
	90-557	8/30/2005	4,900	3,700	6,900	5,800	10 U	10 U	368,000	115,263
	90-577	10/11/2005	6800	5700	12000	6800	10 U	10 U	631309	361213
VW-40-03	90-501	3/28/2005	21,500	5,800	10 U	6,800	10 U	10 U	605,436	101,617
	90-514	5/2/2005	68,400	8,000	7,700	9,100	10 U	10 U	795,153	127,275
	90-523	5/31/2005	60,200	8,700	7,900	8,300	10 U	10 U	643,690	139,164
	90-537	6/28/2005	59,500	7,800	8,400	8,900	10 U	10 U	605,443	140,877
	90-538 (FD)	6/28/2005	63,900	8,000	7,900	8,400	10 U	10 U	583,222	131,961
	90-549	8/2/2005	53,900	6,900	10,100	9,600	10 U	10 U	609,624	168,530
	90-560	8/30/2005	55,200	6,500	12,000	6,500	10 U	10 U	564,329	152,505
	90-567	10/11/2005	61900	6400	11100	7300	10 U	10 U	676207	296098
VW-40-04	90-505	3/28/2005	12,700	340 J	170 J	220 U	10 U	10 U	10 U	1,585
	90-506 (FD)	3/28/2005	6,900	270 J	140 J	220 U	10 U	10 U	10 U	2,179
	90-519	5/2/2005	8,300	380 J	390 J	220 U	10 U	10 U	10 U	3,526
	90-527	5/31/2005	11,600	270 J	110 U	220 U	10 U	10 U	10 U	4,968
	90-528 (FD)	5/31/2005	9,900	280 J	110 U	220 U	10 U	10 U	10 U	5,272
	90-543	6/28/2005	10,000	230 J	110 U	220 U	10 U	10 U	10 U	3,315
	90-552	8/2/2005	3,800	260 J	300 J	220 U	10 U	10 U	10 U	4,973
	90-565	8/30/2005	8,300	340 J	400 J	450 U	10 U	10 U	7,669	6,408
	90-571	10/11/2005	6600	380 J	850 J	220 U	10 U	10 U	10 U	8,391
VW-40-05	90-507	3/28/2005	5,600	190 J	110 U	220 U	10 U	10 U	10 U	2,228
	90-518	5/2/2005	8,600	1400 J	1,300	220 U	10 U	10 U	10 U	13,703
	90-529	5/31/2005	8,400	230 J	110 U	220 U	10 U	10 U	10 U	16,215
	90-542	6/28/2005	20,600	700 J	210 J	220 U	10 U	10 U	10 U	3,589
	90-553	8/2/2005	2,300	120 U	130 J	220 U	10 U	10 U	10 U	20,112
	90-566	8/30/2005	310 J	24 U	22 U	45 U	10 U	10 U	2,783	3,253
	90-572	10/11/2005	5300	230 J	730 J	220 U	10 U	10 U	10 U	19,661

TABLE 5-2

SUMMARY OF LABORATORY ANALYSIS RESULTS – COCS AND DEGRADATION BY-PRODUCT GASSES IN SOIL VAPOR SAMPLES

Sample Location	Sample Number	Sample Date	PCE µg/m^3	TCE µg/m^3	cis-1,2-DCE µg/m^3	VC µg/m^3	Ethene ppmv	Ethane ppmv	Methane ppmv	CO_2 ppmv
VW-40-06	90-504	3/28/2005	21,100	810 J	330 J	220 U	10 U	10 U	10 U	6,916
	90-520	5/2/2005	9,500	730 J	260 J	220 U	10 U	10 U	10 U	18,417
	90-526	5/31/2005	24,300	1,500	210 J	220 U	10 U	10 U	10 U	17,869
	90-541	6/28/2005	37,700	2,600	380 J	220 U	10 U	10 U	10 U	31,144
	90-551	8/2/2005	9,800	940 J	330 J	220 U	10 U	10 U	10 U	18,169
	90-564	8/30/2005	60,000	4,700	880 J	2,500	10 U	10 U	341,152	83,671
	90-570	10/11/2005	44700	5900	4000 J	1700 J	10 U	10 U	834,584	102,375
Nested Probes in Injection Wells										
IW-1	90-500	3/28/2005	9,000	7,900	11,000	3,300	10 U	10 U	589,025	168,625
	90-522	5/2/2005	19,200	12,400	20,400	4,600	10 U	10 U	648,048	197,898
	90-531	5/31/2005	17,600	9,400	21,500	3,400	10 U	10 U	671,226	219,335
	90-534	6/28/2005	26,700	15,200	25,500	3,500	10 U	10 U	627,595	200,383
	90-545	8/2/2005	7,000	4,100	7,800	370 J	10 U	10 U	135,748	72,200
	90-558	8/30/2005	15,900	8,200	36,500	4,000	10 U	10 U	496,074	248,473
	90-559 (FD)	8/30/2005	16,800	8,500	40,000	4,400	10 U	10 U	493,620	247,230
	90-574	10/11/2005	7900	5500	26000	3700	10 U	10 U	606,383	348,998
	90-575 (FD)	10/11/2005	7700	5900	29500	4000	10 U	10 U	588,650	340,629
IW-3	90-508	3/28/2005	7,500	120 U	110 U	220 U	10 U	10 U	10 U	3,759
	90-521	5/2/2005	10,600	180 J	130 J	220 U	10 U	10 U	25,456	42,068
	90-530	5/31/2005	11,800	260 J	110 U	220 U	10 U	10 U	116,811	37,141
	90-544	6/28/2005	14,600	1,200	770 J	450 J	10 U	10 U	154,852	45,716
	90-554	8/2/2005	4,800	1,800	1,400	810	10 U	10 U	111,607	43,506
	90-563	8/30/2005	1500 J	360 J	280 J	480 J	10 U	10 U	193,680	15,306
	90-573	10/11/2005	17500	6500	1300	5000	10 U	10 U	653,693	70,689
IW-7	90-502	3/28/2005	42,200	3,100	1,200	220 U	10 U	10 U	147,126	36,985
	90-513	5/2/2005	67,300	3,700	870 J	240 J	10 U	10 U	338,509	44,185
	90-524	5/31/2005	58,200	4,100	1,300	300 J	10 U	10 U	235,674	35,914
	90-540	6/28/2005	123,000	6,300	1300 J	890 U	10 U	10 U	402,827	13,846
	90-555	8/2/2005	20,300	1200 J	210 J	220 U	10 U	10 U	62,906	27,829
	90-561	8/30/2005	91,400	8,300	27,200	1100 J	10 U	10 U	451,508	47,866
	90-569	10/11/2005	4600 J	480 U	74900	19600	10 U	10 U	825,402	71,185
Nested Probes in Groundwater Monitoring Wells										
MW-40-34	90-503	3/28/2005	12,000	890	430	45 U	10 U	10 U	10 U	4,611
	90-512	5/2/2005	660 J	24 U	22 U	45 U	10 U	10 U	10 U	6,900
	90-525	5/31/2005	29,000	1000 J	880	220 U	10 U	10 U	17,487	12,455
	90-539	6/28/2005	13,300	710 J	490 J	220 U	10 U	10 U	10 U	12,496
	90-550	8/2/2005	7,300	520 J	630 J	220 U	10 U	10 U	10 U	11,637
	90-562	8/30/2005	NA	NA	NA	NA	NA	NA	NA	NA
	90-568	10/11/2005	16800	910 J	1100	330 J	10 U	10 U	683,265	56,779

Notes:
µg/m^3 - micrograms per cubic meter
cis-1,2-DCE - cis-1,2-dichloroethene
CO_2 - carbon dioxide
COC - chemical of concern
FD - field duplicate
J - estimated value
NA - not available
PCE - tetrachloroethene
ppmv - parts per million by volume
TCE - trichloroethene
U - not detect at or below reporting limit
VC - vinyl chloride

TABLE 5-3

SUMMARY OF LABORATORY ANALYTICAL RESULTS – SUBSTRATE INDICATOR PARAMETERS

Location	Sample No	Sample Date	COD mg/L	Total Organic Carbon mg/L	Pyruvic Acid mg/L	Lactic Acid mg/L	Formic Acid mg/L	Acetic Acid mg/L	Propionic Acid mg/L	Butyric Acid mg/L
HydroPunch - Temporary Groundwater Monitoring Wells										
HP-1	90-085	06/08/05	10 U	1.66	NA	NA	NA	NA	NA	NA
HP-2	90-082	06/08/05	10 U	2.35	NA	NA	NA	NA	NA	NA
HP-3	90-083	06/08/05	10 U	2.22	NA	NA	NA	NA	NA	NA
HP-4	90-084	06/08/05	10 U	1.73	NA	NA	NA	NA	NA	NA
HP-5	90-081	06/08/05	10 U	3.91	NA	NA	NA	NA	NA	NA
Injection Wells										
IW-6	90-129	07/06/05	319	153	<40	<0	<0	320.8	53	3.1
IW-7	90-128	07/06/05	148	44.2	<4	<1	<1	88.5	11.9	1.6
IW-8	90-122	07/05/05	375	1490	<4	<1	<1	981.3	1478	1187
IW-9	90-120	07/05/05	2350	1880	<4	6.1	<1	1027	1688	937.8
IW-12	90-127	07/06/05	160	57	<4	<1	<1	133.2	16.1	<1
IW-13	90-125	07/05/05	49.9	7.06	<4	<1	<1	7.1	<1	<1
IW-14	90-123	07/05/05	352	113	<4	<1	<1	181.8	78.1	17
IW-15	90-040	04/15/05	8750	NA	NA	NA	NA	NA	NA	NA
IW-17	90-124	07/05/05	422	241	<4	<1	<1	229.3	315.4	4
IW-18	90-158	08/23/05	36	2.94	NA	NA	NA	NA	NA	NA
Groundwater Monitoring Wells										
MW-40-01	90-026	03/25/05	10 U	2.79	<4	<1	<1	<1	<1	<1
	90-111	06/30/05	10 U	2.23	<4	<1	<1	<1	<1	<1
	90-205	09/30/05	10.4	1.78	<4	<1	<1	<1	<1	<1
MW-40-02	90-027	03/25/05	10 U	3.51	<4	<1	<1	<1	<1	<1
	90-058	04/27/05	23.7	3.69	<4	<1	<1	<1	<1	<1
	90-075	05/26/05	11.8	3.71	<4	<1	<1	<1	<1	<1
	90-112	06/30/05	34.7	3.73	<4	<1	<1	<1	<1	<1
	90-145	07/29/05	10 U	3.33	<4	<1	<1	<1	<1	<1
	90-162	08/23/05	13.8	2.63	<4	<1	<1	<1	<1	<1
	90-206	09/30/05	15.6	2.89	<4	<1	<1	<1	<1	<1
MW-40-06	90-002	03/21/05	10 U	1 U	<4	<1	<1	<1	<1	<1
	90-087	06/27/05	11.6	1.2	<4	<1	<1	<1	<1	<1
	90-177	09/26/05	12.6	1.49	<4	<1	<1	<1	<1	<1
MW-40-07	90-013	03/23/05	10 U	1.27	<4	<1	<1	<1	<1	<1
	90-060	05/03/05	65.2	NA	NA	NA	NA	NA	NA	NA
	90-079	05/26/05	10 U	1.33	NA	NA	NA	NA	NA	NA
	90-108	06/30/05	10 U	1.71	<4	<1	<1	<1	<1	<1
	90-147	07/29/05	10 U	1.79	NA	NA	NA	NA	NA	NA
	90-159	08/23/05	11.1	1.25	NA	NA	NA	NA	NA	NA
	90-200	09/29/05	20.9	2.37	<4	<1	<1	<1	<1	<1
MW-40-08	90-018	03/24/05	11.3	2.76	<4	<1	<1	<1	<1	<1
	90-103	06/29/05	10 U	2.48	<4	<1	<1	<1	<1	<1
	90-194	09/28/05	10 U	3.74	<4	<1	<1	<1	<1	<1
MW-40-10	90-001	03/21/05	43.8	1 U	<4	<1	<1	<1	<1	<1
	90-086	06/27/05	92.6	0.576 J	<4	<1	<1	<1	<1	<1
	90-176	09/26/05	62.8	1.01	<4	<1	<1	<1	<1	<1
MW-40-11	90-024	03/25/05	76.3	1 U	<4	<1	<1	<1	<1	<1
	90-118	07/01/05	120	1 U	<4	<1	<1	<1	<1	<1
	90-203	09/29/05	86	1.49	<4	<1	<1	<1	<1	<1
MW-40-13	90-014	03/23/05	123	1 U	<4	<1	<1	<1	<1	<1
	90-116	07/01/05	120	1.01	<4	1.2	<1	<1	<1	<1
	90-201	09/29/05	120	1.46	<4	<1	<1	<1	<1	<1

TABLE 5-3

SUMMARY OF LABORATORY ANALYTICAL RESULTS – SUBSTRATE INDICATOR PARAMETERS

Location	Sample No	Sample Date	COD mg/L	Total Organic Carbon mg/L	Pyruvic Acid mg/L	Lactic Acid mg/L	Formic Acid mg/L	Acetic Acid mg/L	Propionic Acid mg/L	Butyric Acid mg/L
MW-40-14	90-005	03/22/05	14.6	1.08	<4	<1	<1	<1	<1	<1
	90-043	04/26/05	61.4	16.5	<4	<1	<1	9.9	15.2	<1
	90-063	05/24/05	533	156	<4	<1	<1	141.4	175.4	3.3
	90-090	06/27/05	1010	363	<4	<1	<1	295.8	569.4	3.9
	90-132	07/26/05	1080	325	<4	<1	<1	237.7	423.6	<1
	90-151	08/22/05	2080	625	<4	<1	<1	543.0	798.8	395.8
	90-179	09/26/05	2010	762	<4	<1	<1	666.4	871.1	63.7
MW-40-15	90-016	03/24/05	10 U	1.04	<4	<1	<1	<1	<1	<1
	90-106	06/30/05	10 U	1.04	<4	<1	<1	<1	<1	<1
	90-196	09/28/05	10 U	2.2	<4	<1	<1	<1	<1	<1
MW-40-17	90-017	03/24/05	10 U	3.4	<4	<1	<1	<1	<1	<1
	90-104	06/29/05	10 U	2.99	<4	<1	<1	<1	<1	<1
	90-195	09/28/05	10 U	3.94	<4	<1	<1	<1	<1	<1
MW-40-19	90-012	03/23/05	11.7	1.72	<4	<1	<1	<1	<1	<1
	90-095	06/28/05	10 U	2.4	<4	<1	<1	<1	<1	<1
	90-181	09/27/05	10 U	3.03	<4	<1	<1	<1	<1	<1
MW-40-20	90-011	03/23/05	134	1 U	<4	<1	<1	<1	<1	<1
	90-115	07/01/05	1260	490	<40	1.3	2.4	483	703	107.1
	90-182	09/27/05	4520	1630	<40	<1	<1	1001	1350	892.8
MW-40-22	90-004	03/22/05	20.4	4.83	<4	<1	<1	<1	<1	<1
	90-042	04/25/05	34.5	4.5	<4	<1	<1	<1	<1	<1
	90-062	05/24/05	14.8	4.04	<4	<1	<1	<1	<1	<1
	90-089	06/27/05	40.5	4.21	<4	<1	<1	<1	<1	<1
	90-131	07/26/05	14.6	7.47	<4	<1	<1	<1	<1	<1
	90-150	08/22/05	55.3	7.6	<4	<1	<1	<1	<1	<1
	90-178	09/26/05	30.1	4.44	<4	<1	<1	<1	<1	<1
MW-40-30	90-022	03/24/05	25.4	2.14	<4	<1	<1	<1	<1	<1
	90-050	04/27/05	23.7	2.32	<4	<1	<1	<1	<1	<1
	90-070	05/25/05	10 U	2.42	<4	<1	<1	<1	<1	<1
	90-100	06/29/05	17.4	3.39	<4	6.2	<1	<1	1.8	1.8
	90-140	07/27/05	10 U	2.79	<4	<1	<1	<1	<1	<1
	90-166	08/24/05	77.7	2.72	<4	<1	<1	<1	<1	<1
	90-190	09/28/05	10 U	3.58	<4	<1	<1	<1	<1	<1
MW-40-31	90-020	03/24/05	130	1.14	<4	<1	<1	<1	<1	<1
	90-051	04/27/05	302	2030	<40	72.1	<10	1422	2669	201.2
	90-071	05/25/05	545	2850	<40	58.5	11.7	1361	2436	307.1
	90-117	07/01/05	469	2800	<40	38	<1	1958	3655	1216
	90-141	07/27/05	1430	34.4	<80	<20	<20	1926.0	3490.0	579.6
	90-167	08/24/05	7100	2550	<4	<1	<1	2224.0	3651.0	556.7
	90-191	09/28/05	5920	2700	<4	<1	<1	2260	3449	687.3
MW-40-32	90-019	03/24/05	19.8	2.4	<4	<1	<1	<1	<1	<1
	90-052	04/27/05	10 U	2.82	<4	<1	<1	<1	<1	<1
	90-072	05/25/05	231	75.1	<4	<1	<1	178.9	58.7	<1
	90-101	06/29/05	153	60.2	<4	3.9	<1	132.3	20.9	<1
	90-143	07/27/05	84.3	34.3	<4	<1	<1	56.8	19.3	<1
	90-168	08/24/05	85.8	14	<4	<1	<1	22.2	<1	<1
	90-193	09/28/05	10 U	4.52	<4	<1	<1	<1	<1	<1
MW-40-33	90-010	03/23/05	10 U	2.66	<4	<1	<1	<1	<1	<1
	90-044	04/26/05	10 U	3.51	<4	<1	<1	<1	<1	<1
	90-064	05/24/05	10 U	2.89	<4	<1	<1	<1	<1	<1
	90-091	06/27/05	10 U	2.93	<4	<1	<1	<1	<1	<1
	90-133	07/26/05	10 U	3.26	<4	<1	<1	<1	<1	<1
	90-152	08/22/05	24.9	3.42	<4	<1	<1	<1	<1	<1
	90-184	09/27/05	10 U	4.79	<4	<1	<1	<1	<1	<1

TABLE 5-3

SUMMARY OF LABORATORY ANALYTICAL RESULTS – SUBSTRATE INDICATOR PARAMETERS

Location	Sample No	Sample Date	COD mg/L	Total Organic Carbon mg/L	Pyruvic Acid mg/L	Lactic Acid mg/L	Formic Acid mg/L	Acetic Acid mg/L	Propionic Acid mg/L	Butyric Acid mg/L
MW-40-34	90-009	03/23/05	10 U	3.42	<4	<1	<1	<1	<1	<1
	90-045	04/26/05	14.6	2.35	<4	<1	<1	<1	<1	<1
	90-065	05/24/05	10 U	2.53	<4	<1	<1	<1	<1	<1
	90-094	06/28/05	290	101	<4	<1	<1	273.4	<1	<1
	90-134	07/26/05	10 U	19.1	<4	<1	<1	21.8	<1	<1
	90-153	08/22/05	33.2	4.19	<4	<1	<1	<1	<1	<1
	90-185	09/27/05	20.8	3.38	<4	<1	<1	<1	<1	<1
MW-40-35	90-006	03/22/05	55.5	1.23	<4	<1	<1	<1	<1	<1
	90-046	04/26/05	9360	3710	<20	3344	<5	1553	3146	44.9
	90-066	05/26/05	8590	7600	<40	10229	<50	1456	2714	179.8
	90-114	07/01/05	19900	7890	<40	12747	44.6	1251	3225	4395
	90-135	07/26/05	15400	7150	<400	13921.0	<100	1471.0	4347.0	6221.0
	90-155	08/22/05	24900	6660	<200	5120.0	<50	1096.0	2523.0	2238.0
	90-186	09/27/05	11000	6020	<80	3592	<20	2062	4353	3932
MW-40-36	90-007	03/22/05	10 U	1.92	<4	<1	<1	<1	<1	<1
	90-047	04/26/05	10 U	1.67	<4	<1	<1	<1	<1	<1
	90-067	05/25/05	10 U	1.84	<4	<1	<1	<1	<1	<1
	90-098	06/29/05	11.6	1.61	<4	1.6	<1	<1	<1	<1
	90-137	07/27/05	10 U	2.95	<4	<1	<1	<1	<1	<1
	90-157	08/23/05	72	1.25	<4	4	<1	<1	<1	<1
	90-187	09/27/05	10 U	2.17	<4	<1	<1	<1	<1	<1
MW-40-37	90-008	03/22/05	11.7	1.67	<4	<1	<1	<1	<1	<1
	90-048	04/26/05	11.7	6.05	<4	<1	<1	<1	<1	<1
	90-068	05/25/05	23.7	2.19	<4	<1	<1	<1	<1	<1
	90-099	06/29/05	11.6	2.18	<4	1.1	<1	<1	<1	<1
	90-139	07/27/05	10 U	2.67	<4	<1	<1	<1	<1	<1
	90-161	08/23/05	27.7	1.88	<4	<1	<1	<1	<1	<1
	90-188	09/27/05	10 U	3.21	<4	<1	<1	<1	<1	<1
MW-40-38	90-023	03/25/05	10 U	2.13	<4	<1	<1	<1	<1	<1
	90-053	04/27/05	10 U	2.32	<4	<1	<1	<1	<1	<1
	90-073	05/26/05	10 U	2.19	<4	<1	<1	<1	<1	<1
	90-109	06/30/05	10 U	2.25	<4	<1	<1	<1	<1	<1
	90-146	07/29/05	10 U	2.52	<4	<1	<1	<1	<1	<1
	90-165	08/24/05	88.4	2.33	<4	<1	<1	<1	<1	<1
	90-202	09/29/05	13	3.56	<4	<1	<1	<1	<1	<1
MW-40-39	90-015	03/23/05	10 U	1.61	<4	<1	<1	<1	<1	<1
	90-049	04/28/05	26.7	1.49	NA	NA	NA	NA	NA	NA
	90-069	05/26/05	29.6	1.37	NA	NA	NA	NA	NA	NA
	90-107	06/30/05	11.6	1.19	<4	<1	<1	<1	<1	<1
	90-148	07/29/05	10 U	1.57	NA	NA	NA	NA	NA	NA
	90-160	08/23/05	11.1	1.18	NA	NA	NA	NA	NA	NA
	90-198	09/29/05	18.3	2.04	<4	<1	<1	<1	<1	<1

Notes:
COD - chemical oxygen demand
J - estimated value
mg/L - milligrams per liter
NA - not available
U - not detected at or below the reporting limit

TABLE 5-4

FIELD PARAMETERS TESTING RESULTS

Sample Location	Sample No	Sample Date	Alkalinity mg/L	Carbon Dioxide ppm	Chemical Oxygen Demand mg/L	Dissolved Oxygen mg/L	Iron mg/L	Nitrate mg/L	Oxidation Reduction Potential[a] millivolt	pH pH units	Specific Conductivity µmhos/cm	Sulfate mg/L	Temperature °C
HydroPunch - Temporary Groundwater Monitoring Wells													
HP-1	90-085	06/08/05	286	18	7	0.4	0	0.3	170	7.48	2530	200	24.58
HP-2	90-082	06/08/05	320	16.5	0	0.3	0	1.3	201	7.22	2360	200	24.17
HP-3	90-083	06/08/05	260	14	0	0.39	0.4	0	185	7.38	1690	200	24.85
HP-4	90-084	06/08/05	244	18	0	0.39	0	0	177	7.44	2760	200	24.16
HP-5	90-081	06/08/05	298	15.5	0	0.38	0.2	0	210	7.72	1510	200	23.86
Injection Wells, and Lactate Solution													
IW-5	90-039	04/11/05	1550	300	825	0.19	4.4	27.6	-539	6.15	15900	50	22.11
IW-6	90-129	07/06/05	887	100	45	0.55	0.3	15	-256	6.35	1950	50	22.08
	90-170	08/30/05	NA	NA	NA	0.2	NA	NA	39	6.14	4100	NA	24.04
IW-7	90-128	07/06/05	4.74	37	27	0.45	0.3	7.9	-227	6.6	1478	175	22.36
IW-7 Lactate Solution	90-FP-034	04/15/05	NA	NA	9000	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-038	05/04/05	NA	NA	12528	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-038B (FD)	05/04/05	NA	NA	13320	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-054	05/10/05	NA	NA	11250	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-054B (FD)	05/10/05	NA	NA	18000	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-061	05/24/05	NA	NA	18000	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-061B (FD)	05/24/05	NA	NA	18000	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-062	05/25/05	NA	NA	18000	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-062B (FD)	05/25/05	NA	NA	18000	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-063	05/26/05	NA	NA	18000	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-063B (FD)	05/26/05	NA	NA	18000	NA	NA	NA	NA	NA	NA	NA	NA
IW-8	90-122	07/05/05	1750	150	1728	0.29	7.2	17	55	6.1	4950	50	22.16
	90-171	08/30/05	NA	NA	NA	0.17	NA	NA	87	6.3	11360	NA	24.55
IW-9	90-120	07/05/05	1450	300	2916	0.44	7.6	17.8	62	6.13	5380	50	20.96
IW-9 Lactate Solution	90-FP-024	04/11/05	NA	NA	823	NA	NA	NA	NA	NA	NA	NA	NA
IW-12	90-127	07/06/05	554	50	1224	0.48	0.9	2.6	-87	6.44	1560	50	22.34
IW-13	90-125	07/05/05	270	25	0	0.48	0	5.8	-264	6.56	2190	73	23.53
	90-172	08/30/05	NA	NA	NA	0.21	NA	NA	60	6.24	3850	NA	24.37
IW-14	90-123	07/05/05	262	35	54	0.25	0.7	1.4	-11	6.42	2110	73	23.56
IW-15	90-FP-027	04/12/05	NA	NA	816	NA	NA	NA	NA	NA	NA	NA	NA
	90-040	04/15/05	NA	NA	8856	0.31	NA	NA	-510	6.36	7860	NA	21.63
IW-15 Lactate Solution	90-041	04/15/05	NA	NA	9000	NA	NA	NA	NA	NA	NA	NA	NA
IW-16 Lactate Solution	90-FP-060	05/12/05	NA	NA	13104	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-060B (FD)	05/12/05	NA	NA	14221	NA	NA	NA	NA	NA	NA	NA	NA
IW-17	90-124	07/05/05	765	40	332	0.3	1.6	2.2	66	6.33	1570	50	22.63
IW-18	90-158	08/23/05	280	25	0	0.37	0	0.7	121	6.93	2200	200	23.72
Groundwater Monitoring Wells													
MW-40-01	90-026	03/25/05	389	21	0	5.57	0	1.4	-664	7.41	944	65	20.88
	90-111	06/30/05	NA	NA	NA	4.9	NA	NA	157	7.33	849	NA	22.72
	90-205	09/30/05	258	15.5	0	1.94	0	6.4	30	7.06	1198	85	23.98
MW-40-02	90-027	03/25/05	375	31	12	0.38	0	0.2	-619	6.76	1144	95	19.86
	90-FP-033	04/12/05	285	55	0	0.38	0	0.7	139	6.91	1154	95	20.03
	90-058	04/27/05	318	22	8	0.09	0	1.3	-264	6.68	1219	150	20.45
	90-FP-059	05/12/05	330	25	0	0.21	0	0.9	0	6.88	1012	90	20.47
	90-075	05/26/05	348	20	0	0.24	0	0.8	237	6.77	1101	135	20.42

TABLE 5-4

FIELD PARAMETERS TESTING RESULTS

Sample Location	Sample No	Sample Date	Alkalinity mg/L	Carbon Dioxide ppm	Chemical Oxygen Demand mg/L	Dissolved Oxygen mg/L	Iron mg/L	Nitrate mg/L	Oxidation Reduction Potential[a] millivolt	pH pH units	Specific Conductivity µmhos/cm	Sulfate mg/L	Temperature °C
MW-40-02	90-FP-074	06/09/05	316	16	0	0.1	0	1.7	48	7.06	993	100	21.16
	90-112	06/30/05	NA	NA	NA	0.22	NA	NA	157	6.69	1004	NA	22.17
	90-FP-090	07/14/05	237	17	0	0.29	0	0.1	132	6.9	1023	85	21.6
	90-145	07/29/05	261	25	23	0.31	0	0.3	154	7.16	1050	9	21.97
	90-FP-102	08/10/05	260	15	0	0.28	0	1.2	220	6.86	1080	200	22.28
	90-162	08/23/05	188	13	0	0.35	0	0.8	136	7.04	1174	95	23.42
	90-FP-117	09/16/05	270	18	79	0.16	0	6.1	2	6.92	1242	100	22.98
	90-206	09/30/05	230	16	14	0.16	0	7.4	42	6.69	1248	125	23.2
MW-40-06	90-002	03/21/05	154	15	37	0.63	0	3.8	-660	7.21	2200	200	22.97
	90-087	06/27/05	208	14.5	0	0.13	0	1.5	203	6.9	2220	200	23.11
	90-177	09/26/05	172	15	0	0.16	0	2.3	148	7.1	2280	200	24.04
MW-40-07	90-013	03/23/05	218	20	0	0.43	0.2	1.1	NA	7.31	2130	200	22.99
	90-060	05/03/05	NA	NA	3	0.32	NA	NA	250	7.12	2220	NA	23.61
	90-079	05/26/05	238	16	16	0.19	0	0.8	162	7.07	2320	200	23.45
	90-108	06/30/05	NA	NA	NA	0.24	NA	NA	151	7.11	2040	NA	23.42
	90-FP-083	07/13/05	238	11	0	0.25	0	1.6	124	6.89	2100	160	23.98
	90-147	07/29/05	239	23	6	0.18	0	0.7	153	7.28	2140	200	23.6
	90-FP-103	08/10/05	23.6	13	0	0.19	0	1.5	216	7.19	2190	200	23.93
	90-159	08/23/05	210	15	0	0.2	0	1.1	125	7.29	2220	200	23.68
	90-FP-112	09/15/05	2	12	0	0.17	0	1.1	4	7.27	2510	200	24.29
	90-200	09/29/05	228	18	0	0.24	0	40	66	7.05	2470	200	23.84
MW-40-08	90-018	03/24/05	286	23	29	2.1	0.4	0.8	NA	7.25	1750	200	19.24
	90-103	06/29/05	240	20	33	0.61	0	0.8	88	6.99	1680	200	20.22
	90-194	09/28/05	260	19	8	0.25	0	9.2	32	7.03	1660	200	20.95
MW-40-10	90-001	03/21/05	117	16	47	7.17	1.2	0.7	-504	7.03	8990	200	22.22
	90-086	06/27/05	145	18	45	0.61	0.4	0	174	6.76	9690	200	22.39
	90-176	09/26/05	94	14	21	0.22	0.6	1.5	127	6.86	9060	200	22.65
MW-40-11	90-024	03/25/05	197	32	52	0.69	0	0.6	-615	7.07	9500	200	21.8
	90-118	07/01/05	1250	15	48	0.14	0	0.6	107	6.68	8270	200	22.94
	90-203	09/29/05	110	11	113	0.23	0	0.4	52	6.83	10120	200	23.62
MW-40-13	90-014	03/23/05	116	30	88	0.47	0	0.7	NA	6.84	1136	200	22.51
	90-116	07/01/05	113	19	122	0.18	0	35	77	6.65	9760	200	23.31
	90-201	09/29/05	126	17	64	0.2	0	1.8	67	6.65	11560	200	23.98
MW-40-14	90-005	03/22/05	160	19	34	0.3	0	2.7	-504	7.24	2820	200	21.35
	90-FP-009	04/04/05	NA	NA	NA	0.21	NA	NA	68	6.67	2890	NA	21.77
	90-FP-021	04/11/05	350	100	15	0.17	0	0.9	-89	6.71	3070	200	21.59
	90-043	04/26/05	341	10	0	0.07	4	1.6	-288	6.68	3180	200	21.58
	90-FP-037	05/04/05	NA	NA	0	0.22	NA	NA	-74	7.35	2900	NA	21.67
	90-FP-047	05/10/05	310	40	0	0.18	2.1	1.7	-68	6.63	2670	200	21.76
	90-063	05/24/05	600	75	75	0.21	4.6	5.8	-55	6.42	3150	200	22.09
	90-FP-065	06/09/05	590	100	123	0.11	3.8	0	-187	6.57	2920	200	22.06
	90-090	06/27/05	670	90	648	0.06	4	2.5	-199	6.05	3200	200	22.75
	90-FP-078	07/13/05	710	55	162	0.29	5.2	2.9	20	6.36	2850	175	22.29
	90-132	07/26/05	560	9	415	0.13	5.6	10.5	2	6.2	2650	200	22.78
	90-FP-092	08/09/05	574	80	103	0.17	2.9	31	155	5.89	2830	125	22.62

TABLE 5-4

FIELD PARAMETERS TESTING RESULTS

Sample Location	Sample No	Sample Date	Alkalinity mg/L	Carbon Dioxide ppm	Chemical Oxygen Demand mg/L	Dissolved Oxygen mg/L	Iron mg/L	Nitrate mg/L	Oxidation Reduction Potential[a] millivolt	pH pH units	Specific Conductivity µmhos/cm	Sulfate mg/L	Temperature °C
MW-40-14	90-151	08/22/05	888	375	812	0.13	6.9	28.5	94	6.05	3280	200	22.61
	90-FP-106	09/15/05	84	100	407	0.13	7.2	35	-133	6.04	3690	200	22.58
	90-179	09/26/05	1220	375	967	0.07	4.4	3.6	-241	5.91	4260	195	22.74
MW-40-15	90-016	03/24/05	255	25	8	2.83	0.2	0.4	NA	7.28	2310	200	21.24
	90-106	06/30/05	NA	NA	NA	0.19	NA	NA	149	7	2010	NA	21.44
	90-196	09/28/05	270	22	0	0.2	0	6.8	52	6.89	2460	200	22.71
MW-40-17	90-017	03/24/05	278	25	28	1.06	0	0.5	NA	7.32	1680	100	19.55
	90-104	06/29/05	260	14.5	27	0.14	0	0.7	110	7.01	1540	200	20.65
	90-195	09/28/05	264	17	0	0.14	0	9.5	44	7.07	1800	200	21.08
MW-40-19	90-012	03/23/05	125	13	0	0.84	0.4	2.7	-833	7.55	1064	125	21.54
	90-095	06/28/05	135	10	0	0.15	0	0.8	135	7.35	1130	125	21.8
	90-181	09/27/05	154	10	0	0.36	0	6.4	96	7.36	1076	195	22.21
MW-40-20	90-011	03/23/05	137	35	139	1.3	0	0.6	-770	6.96	12900	200	21.24
	90-115	07/01/05	700	140	918	0.15	0	0	-66	6.49	10580	200	21.57
	90-182	09/27/05	1730	375	2758	0.1	9.4	0	-287	6.08	11800	50	22.42
MW-40-22	90-004	03/22/05	1210	190	29	0.29	3.8	3.7	-482	7.09	3430	50	22.03
	90-FP-007	04/04/05	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-008	04/04/05	NA	NA	NA	0.33	NA	NA	-190	6.86	3330	NA	22.67
	90-FP-020	04/11/05	1400	130	17	0.3	3.1	0	-148	6.92	3390	50	22.89
	90-042	04/25/05	1480	170	7	0.02	2.6	9.4	0.93	6.84	3550	65	22.61
	90-FP-046	05/10/05	1410	1.15	11	0.21	0	14.5	-36	6.77	3150	90	22.39
	90-062	05/24/05	1190	70	0	0.19	0	11	-30	6.81	3170	100	22.72
	90-FP-064	06/09/05	1020	60	0	0.1	0.4	13.9	20	7.14	2960	50	22.68
	90-089	06/27/05	1410	16	60	0.06	2.4	3.5	-23	6.53	3350	80	23.76
	90-FP-077	07/13/05	12	100	9	0.45	10	0	64	6.69	2290	85	22.88
	90-131	07/26/05	1020	6	0	0.2	3	5.6	144	6.78	3040	125	23.3
	90-FP-091	08/09/05	1094	100	0	0.15	3.2	0	171	6.66	3050	90	23.21
	90-150	08/22/05	1244	60	0	0.14	3.5	0	112	6.82	3070	125	23.28
	90-FP-105	09/15/05	1230	70	5	0.13	9.6	9.1	-119	7.01	3380	125	23.46
	90-178	09/26/05	1240	85	0	0.1	3.2	0	-114	6.76	3400	150	24.23
MW-40-30	90-022	03/24/05	229	17	30	1.67	0	0.5	NA	7.63	1460	200	20.92
	90-FP-006	04/04/05	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-014	04/04/05	NA	NA	NA	0.63	NA	NA	158	7.41	1394	NA	21.26
	90-FP-030	04/12/05	240	22	21	0.63	0	0.8	58	7.4	1422	190	21.1
	90-050	04/27/05	208	10	0	0.66	0	1.4	-227	7.42	1474	200	20.81
	90-FP-043	05/04/05	NA	NA	7	0.3	NA	NA	-560	7.91	1371	NA	21.05
	90-FP-056	05/12/05	230	10	0	0.19	0	0.4	-557	7.85	1313	200	20.99
	90-070	05/25/05	239	10	0	0.17	0.2	6.1	-497	7.99	1344	200	21.31
	90-FP-070	06/09/05	253	10	0	0.05	0.4	2.2	-84	8.91	1101	200	21.3
	90-100	06/29/05	220	10	19	0.08	0	4.6	23	8.07	1281	90	21.43
	90-FP-086	07/14/05	247	10	0	0.13	0	2.3	105	7.93	1119	100	21.34
	90-140	07/27/05	204	10	0	0.19	0	1.5	122	7.95	1141	200	21.72
	90-FP-098	08/10/05	229	10	0	0.15	0	0.8	247	7.73	1201	200	21.57
	90-166	08/24/05	NA	NA	NA	0.17	NA	NA	218	7.1	1231	NA	21.73
	90-FP-113	09/16/05	250	27	4	0.14	0	1.7	45	6.75	1456	200	21.73
	90-190	09/28/05	260	40	0	0.13	0	1.3	16	6.65	1423	200	21.7

TABLE 5-4

FIELD PARAMETERS TESTING RESULTS

Sample Location	Sample No	Sample Date	Alkalinity mg/L	Carbon Dioxide ppm	Chemical Oxygen Demand mg/L	Dissolved Oxygen mg/L	Iron mg/L	Nitrate mg/L	Oxidation Reduction Potential[a] millivolt	pH pH units	Specific Conductivity µmhos/cm	Sulfate mg/L	Temperature °C
MW-40-31	90-020	03/24/05	123	20	73	0.55	0	0.3	NA	7.09	10640	200	21.08
	90-FP-015	04/04/05	NA	NA	NA	0.55	NA	NA	160	7.07	9650	NA	21.28
	90-FP-029	04/12/05	230	50	380	0.31	0.9	2.4	-273	6.78	10600	200	21.4
	90-051	04/27/05	1090	210	1602	0.07	4.5	3.9	-281	6.78	11760	52	21.18
	90-FP-055	05/12/05	2335	275	1764	0.27	6.6	35	-205	6.43	10530	50	21.18
	90-071	05/25/05	1850	550	3296	0.29	8.8	735	-129	6.16	11160	0	21.98
	90-FP-071	06/09/05	2970	300	3150	0.17	8.4	27.5	-13	6.36	9486	200	21.82
	90-117	07/01/05	2130	425	3780	0.15	8.8	35	43	6	9480	50	21.96
	90-FP-087	07/14/05	2110	400	2628	0.18	5.8	34.3	76	6.35	9540	50	21.83
	90-141	07/27/05	2010	875	2880	0.24	7	35	89	6.6	9490	50	22.51
	90-FP-099	08/10/05	1480	625	2286	0.15	3.9	32.5	200	6.4	9570	20	22.06
	90-167	08/24/05	NA	NA	NA	0.17	NA	NA	174	6.52	9700	NA	22.31
	90-FP-114	09/16/05	2280	500	3960	0.16	7.6	2.4	-105	6.42	10970	52	22.08
	90-191	09/28/05	2580	1860	3618	0.09	7	0	-116	6.23	11010	50	22.32
MW-40-32	90-019	03/24/05	189	15	17	1.09	0	0.5	NA	7.65	1450	200	20.29
	90-FP-016	04/04/05	NA	NA	NA	0.9	NA	NA	161	7.63	1361	NA	20.8
	90-FP-031	04/12/05	180	27	9	0.89	0	0.4	106	7.65	1481	200	18.51
	90-052	04/27/05	186	10	21	0.97	0	0.6	266	7.56	1436	200	20.63
	90-FP-057	05/12/05	234	11	0	0.17	0	0.4	-857	7.54	1253	175	20.25
	90-072	05/25/05	157	20	17	0.2	0.8	1.4	-413	6.52	1317	180	20.96
	90-FP-072	06/09/05	260	10	25	0.03	0	2.5	-246	8.58	1090	180	20.68
	90-101	06/29/05	210	12	41	0.06	0	1	16	7.45	1255	50	21.12
	90-FP-088	07/14/05	312	15	16	0.06	0.6	4.2	94	7.22	1100	50	20.86
	90-143	07/27/05	362	23	27	0.12	0.7	1.2	114	7.27	1154	50	21.41
	90-FP-100	08/10/05	364	15	0	0.07	0.8	3.3	205	7.07	1169	50	21.15
	90-168	08/24/05	NA	NA	NA	0.1	NA	NA	219	6.22	1254	NA	21.6
	90-FP-115	09/16/05	446	40	0	0.11	7.4	1	-160	6.64	1490	50	21.37
	90-193	09/28/05	448	90	20	0.1	3	0.5	-51	6.34	1464	52	21.67
MW-40-33	90-010	03/23/05	120	10	8	1.04	0.2	2	-856	8.13	611	100	20.22
	90-FP-001	04/04/05	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-010	04/04/05	NA	NA	NA	0.39	NA	NA	88	7.87	534	NA	20.51
	90-FP-022	04/11/05	72	15	32	0.49	0	2.2	14	7.88	481	80	20.4
	90-044	04/26/05	78	10	0	0.36	0	1	-298	7.7	490	75	20.08
	90-FP-039	05/04/05	NA	NA	5	0.36	NA	NA	94	8.4	511	NA	20.16
	90-FP-048	05/10/05	103	10	0	0.28	0	2.3	100	7.63	497	95	20.13
	90-064	05/24/05	85	10	0	0.32	0	2	197	7.66	469	80	20.37
	90-FP-066	06/09/05	118	40	0	0.14	0	1.7	-20	8.09	418	85	20.31
	90-091	06/27/05	125	10	17	0.1	0	2.8	116	6.62	498	75	21.05
	90-FP-079	07/13/05	85	10	0	0.22	0	0.7	102	7.78	434	75	20.58
	90-133	07/26/05	110	10	0	0.2	0	1.1	164	7.51	444	100	21.04
	90-FP-093	08/09/05	72	10	0	0.17	0	0.6	195	7.54	431	100	20.94
	90-152	08/22/05	74	10	2	0.17	0	0.6	151	7.66	503	100	21.9
	90-FP-107	09/15/05	43	10	7	0.19	0	2.1	-35	8.03	590	150	21.09
	90-184	09/27/05	112	16	4	0.2	0	9.3	-103	7.69	572	150	21.03

TABLE 5-4

FIELD PARAMETERS TESTING RESULTS

Sample Location	Sample No	Sample Date	Alkalinity mg/L	Carbon Dioxide ppm	Chemical Oxygen Demand mg/L	Dissolved Oxygen mg/L	Iron mg/L	Nitrate mg/L	Oxidation Reduction Potential[a] millivolt	pH pH units	Specific Conductivity µmhos/cm	Sulfate mg/L	Temperature °C
MW-40-34	90-009	03/23/05	223	11	16	0.95	0	0	-743	8.09	1180	175	21.06
	90-FP-002	04/04/05	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-011	04/04/05	NA	NA	NA	0.27	NA	NA	125	7.42	1580	NA	21.77
	90-FP-023	04/11/05	279	17	20	0.5	0	0.6	74	7.35	1710	200	21.76
	90-045	04/26/05	295	10	0	0.16	0	1.4	-299	7.14	2040	200	21.58
	90-FP-040	05/04/05	NA	NA	0	0.32	NA	NA	134	7.76	1870	NA	21.51
	90-FP-049	05/10/05	263	16	0	0.23	0	1	-190	7.18	1780	200	21.67
	90-065	05/24/05	311	11	0	0.2	0.6	1.2	-553	7	1740	200	21.69
	90-FP-067	06/09/05	2.81	15	13	0.07	0	6.6	-243	7.37	1119	200	21.45
	90-094	06/28/05	195	35	45	0.11	2.1	0	34	6.78	1610	175	21.76
	90-FP-080	07/13/05	326	23	157	0.23	2.5	0.2	-26	6.55	1460	95	21.99
	90-134	07/26/05	403	75	0	0.23	0	0.2	-101	6.78	1452	100	22.62
	90-FP-094	08/09/05	386	32	0	0.15	1.2	4.6	100	6.8	1490	110	22.48
	90-153	08/22/05	312	20	4	0.12	0.4	3	62	6.84	1870	200	22.51
	90-FP-108	09/15/05	315	18	5	0.1	2.4	3.5	-156	7.06	1570	200	22.48
	90-185	09/27/05	348	35	0	0.11	1.6	2.6	-104	6.45	1520	200	22.62
MW-40-35	90-006	03/22/05	172	18	107	1.18	0	0.5	-545	7.2	7430	200	22.67
	90-FP-003	04/04/05	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-012	04/04/05	NA	NA	NA	0.5	NA	NA	181	6.8	5490	NA	22.95
	90-FP-025	04/12/05	540	165	1095	0.34	1.5	2.3	-453	6.35	7040	200	22.21
	90-046	04/26/05	960	400	3564	0.03	3.8	29.4	-347	5.82	9800	200	22.9
	90-FP-050	05/10/05	2160	450	6462	0.18	4	18.8	-295	5.81	10740	50	23.07
	90-066	05/26/05	1420	560	15282	0.13	5.8	35	-301	6	13140	50	22.89
	90-FP-068	06/09/05	2430	425	9702	0.05	6.8	35	-142	6.33	11720	140	23.26
	90-114	07/01/05	2730	560	10404	0.13	6.8	35	-36	6.15	12700	50	23.06
	90-FP-081	07/13/05	4170	560	10872	0.15	3.7	8.4	21	6.14	12410	50	23.56
	90-135	07/26/05	3170	625	8604	0.2	8	35	42	6.31	12200	50	24.01
	90-FP-095	08/09/05	3220	525	7750	0.17	3	735	123	6.14	11290	50	23.65
	90-155	08/22/05	3560	625	10008	0.17	5.2	3	96	6.12	12250	50	24
	90-FP-109	09/15/05	3550	500	8082	0.08	7.4	35	-134	6.17	13760	50	23.95
	90-186	09/27/05	3910	600	8766	0.08	5	35	-135	6.1	13090	50	24.21
MW-40-36	90-007	03/22/05	171	12	9	0.87	0	0.8	-674	7.52	1810	200	22.65
	90-FP-004	04/04/05	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-013	04/04/05	NA	NA	NA	0.44	NA	NA	160	7.23	1690	NA	22.77
	90-FP-026	04/12/05	240	26	0	0.4	0	0.2	34	7.08	1730	200	22.51
	90-047	04/26/05	175	10	0	0.38	0	1.1	-329	6.92	1770	200	22.75
	90-FP-041	05/04/05	NA	NA	12	0.44	NA	NA	154	7.49	1640	NA	22.61
	90-FP-051	05/10/05	208	17	0	0.3	0	0.7	29	6.87	1580	195	23.47
	90-067	05/25/05	204	14	0	0.31	0	0.5	256	6.95	1700	200	22.68
	90-FP-069	06/09/05	212	11	0	0.14	0	0.6	35	7.37	1510	180	22.82
	90-098	06/29/05	160	14	6	0.19	0	1.4	89	7.48	1760	200	22.8
	90-FP-082	07/13/05	194	16	27	0.18	0	0.3	99	6.98	1490	190	23.28
	90-137	07/27/05	180	17	18	0.26	0	0.7	113	7.41	1510	200	23.21
	90-FP-096	08/09/05	212	18	17	0.15	5	0.9	174	6.87	1540	200	23.32
	90-157	08/23/05	142	15	0	0.25	0.14	1.2	116	7.15	1620	200	23.19
	90-FP-110	09/15/05	164	16	1	0.17	6.2	0	-15	7.21	1840	200	23.61
	90-187	09/27/05	160	10.5	2	0.17	0	8.3	10	6.89	1840	200	23.73

TABLE 5-4

FIELD PARAMETERS TESTING RESULTS

Sample Location	Sample No	Sample Date	Alkalinity mg/L	Carbon Dioxide ppm	Chemical Oxygen Demand mg/L	Dissolved Oxygen mg/L	Iron mg/L	Nitrate mg/L	Oxidation Reduction Potential[a] millivolt	pH pH units	Specific Conductivity µmhos/cm	Sulfate mg/L	Temperature °C
MW-40-37	90-008	03/22/05	201	13	2	1.07	0	1.5	-506	7.53	2290	175	22.49
	90-FP-005	04/04/05	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA
	90-FP-017	04/04/05	NA	NA	NA	0.64	NA	NA	175	7.55	2220	NA	22.75
	90-FP-028	04/12/05	190	30	18	0.29	0	0.7	-409	7.29	2190	200	22.45
	90-048	04/26/05	206	10	0	0.09	0.6	3.7	-294	7.27	2320	200	23.12
	90-FP-042	05/04/05	NA	NA	17	0.21	NA	NA	-15	8.03	2250	NA	22.69
	90-FP-052	05/10/05	226	11.5	0	0.21	0	1	15	7.31	2100	200	22.96
	90-068	05/25/05	230	11	0	0.28	0	6.2	161	7.39	2260	200	22.74
	90-FP-075	06/09/05	257	12	0	0.2	0	2	1	7.65	1890	185	27.2
	90-099	06/29/05	310	14	11	0.18	0	1.1	67	7.55	2230	200	22.74
	90-FP-085	07/14/05	240	12	0	0.27	0	1.3	151	7.37	1960	200	22.96
	90-139	07/27/05	238	14	0	0.28	0	1.5	108	7.55	2010	200	23.19
	90-FP-097	08/09/05	228	15	22	0.18	0	1.4	169	7.14	2000	200	23.44
	90-161	08/23/05	180	10	0	0.15	0	0.5	120	7.53	2060	200	23.37
	90-FP-111	09/15/05	206	10.5	0	0.16	0	0.9	-57	7.57	2370	200	23.55
	90-188	09/27/05	240	10	44	0.16	0	1.7	-59	7.28	2340	200	23.64
MW-40-38	90-023	03/25/05	150	14	0	2.19	0	0.6	-588	7.71	1360	175	21.05
	90-FP-019	04/04/05	NA	NA	NA	1.22	NA	NA	188	7.54	1278	NA	21.91
	90-FP-032	04/12/05	155	19	0	0.79	0	4.5	120	7.53	1322	150	21.51
	90-053	04/27/05	153	10	0	0.38	0	0.3	-178	7.39	1394	200	22.01
	90-FP-044	05/04/05	NA	NA	0	0.37	NA	NA	89	7.87	1290	NA	21.58
	90-FP-058	05/12/05	197	11	0	0.28	0	1.3	-171	7.42	1254	200	22.15
	90-073	05/26/05	203	10.5	0	0.3	0	0.4	221	7.42	1330	175	21.63
	90-FP-073	06/09/05	199	10	0	0.16	0	0.7	7	7.74	1184	200	22.19
	90-109	06/30/05	NA	NA	NA	0.15	NA	NA	152	7.36	1195	NA	22.09
	90-FP-089	07/14/05	189	10	0	0.19	0	0.1	121	7.41	1235	180	22.1
	90-146	07/29/05	172	15	7	0.21	0	3.2	151	7.63	1280	150	22.4
	90-FP-101	08/10/05	250	10	0	0.15	0	0.9	218	7.43	1319	150	22.41
	90-165	08/24/05	NA	NA	NA	0.2	NA	NA	217	7.48	1346	NA	22.48
	90-FP-116	09/16/05	198	15.5	9	0.25	0.2	7.2	-32	7.49	1530	200	22.71
	90-202	09/29/05	180	10.5	0	0.23	0	8.4	72	7.31	1494	200	22.95
MW-40-39	90-015	03/23/05	249	20	0	0.34	0.6	0.3	NA	7.9	3430	200	22.74
	90-FP-018	04/04/05	NA	NA	NA	0.51	NA	NA	204	7.3	3290	NA	23.3
	90-049	04/28/05	220	13	0	0.19	0	3.1	-225	7.2	3540	200	22.55
	90-FP-045	05/04/05	NA	NA	0	0.25	NA	NA	155	7.76	3200	NA	23.09
	90-FP-053	05/10/05	254	14	0	0.24	0	4.9	141	7.04	3050	200	23.17
	90-069	05/26/05	237	14	14	0.3	0.2	1.3	233	7.14	3210	200	22.94
	90-FP-076	06/09/05	241	11	0	0.19	0	1.5	64	7.39	2820	200	23.56
	90-107	06/30/05	NA	NA	NA	0.25	NA	NA	148	7.14	2810	NA	23.17
	90-FP-084	07/13/05	225	12.5	0	0.38	0	0.6	134	6.86	2820	200	23.56
	90-148	07/29/05	228	19	16	0.23	0	0.7	152	7.3	2840	200	23.69
	90-FP-104	08/10/05	205	10	0	0.16	0	0.6	214	7.22	2910	200	23.72
	90-160	08/23/05	180	10	0	0.19	0	1.9	126	7.33	2930	200	23.66
	90-FP-118	09/16/05	223	16	1	0.21	0	6.7	13	7.24	3300	200	23.77
	90-198	09/29/05	210	16	0	0.21	0	6.5	55	7.08	3230	200	23.62

Notes:

°C - degrees Celsius — mg/L - milligrams per liter

µmhos/cm - microhos per centimeter — NA - not available

FD - field duplicate — ppm - parts per million

[a] It is noted that ORP data collected from March 22 through March 25 and from early July through the end of August are believed to be unreliable due to a malfunctioning field instrument.

TABLE 5-5

SUMMARY OF LABORATORY ANALYTICAL RESULTS – GEOCHEMISTRY PARAMETERS

Sample Location	Sample No.	Sample Date	Alkalinity mg/L	Chloride mg/L	Nitrate as N mg/L	Nitrite as N mg/L	Sulfate mg/L	TDS mg/L
HydroPunch - Temporary Groundwater Monitoring Wells								
HP-1	90-085	06/08/05	393	551	6.83	0.1 U	450	750
HP-2	90-082	06/08/05	341	482	5.32	0.1 U	403	1740
HP-3	90-083	06/08/05	495	274	2.18	0.1 U	218	1160
HP-4	90-084	06/08/05	460	620	9.53	0.1 U	486	2290
HP-5	90-081	06/08/05	343	237	2.15	0.1 U	202	1140
Injection Wells								
IW-6	90-129	07/06/05	986	115	0.1 U	0.1 U	8.93	1740
IW-7	90-128	07/06/05	520	174	0.1 U	0.1 U	92.3	1180
IW-8	90-122	07/05/05	2770	148	0.1 U	0.1 U	0.5 U	6330
IW-9	90-120	07/05/05	3490	66.3	0.1 U	0.1 U	0.38 J	7460
IW-12	90-127	07/06/05	585	263	0.1 U	0.1 U	19.6	1310
IW-13	90-125	07/05/05	414	485	0.1 U	0.1 U	72.7	1510
IW-14	90-123	07/05/05	585	353	0.1 U	0.1 U	49.3	1640
IW-17	90-124	07/05/05	808	77.7	0.1 U	0.1 U	0.393 J	1530
IW-18	90-158	08/23/05	338	434	1.49	0.5 U	250	1520
Groundwater Monitoring Wells								
MW-40-01	90-026	03/25/05	398	40	2.15	0.01 U	26	645
	90-111	06/30/05	381	55.4	2.81	0.1 U	44.7	650
	90-205	09/30/05	289	144	3.1	0.1 U	65.8	785
MW-40-02	90-027	03/25/05	383	100	4.72	0.01 U	72.9	735
	90-058	04/27/05	391	92.7	5.37	0.1 U	76.4	695
	90-075	05/26/05	341	106	3.33	0.1 U	73.1	760
	90-112	06/30/05	363	110	4.11	0.1 U	75.2	760
	90-145	07/29/05	292	140	3.79	0.1 U	75.5	785
	90-162	08/23/05	279	164	3.69	0.5 U	77.3	750
	90-206	09/30/05	289	158	3.29	0.1 U	76.6	810
MW-40-06	90-002	03/21/05	170	490	2.24	0.01 U	223	1380
	90-087	06/27/05	234	399	2.36	0.1 U	272	1390
	90-177	09/26/05	180	434	0.999	0.5 U	239	1410
MW-40-07	90-013	03/23/05	248	430	4.04	0.012	273	1360
	90-079	05/26/05	262	465	3.5	0.1 U	307	1600
	90-108	06/30/05	249	422	3.49	0.1 U	315	1620
	90-147	07/29/05	248	443	2.79	0.1 U	310	1650
	90-159	08/23/05	256	442	3.33	0.5 U	303	1640
	90-200	09/29/05	249	426	3.45	0.1 U	297	1620
MW-40-08	90-018	03/24/05	301	250	5.79	0.01 U	187	1050
	90-103	06/29/05	290	231	6.31	0.1 U	181	1040
	90-194	09/28/05	284	213	5.72	0.1 U	165	1060
MW-40-10	90-001	03/21/05	128	2500	0.1 U	0.01 U	355	5380
	90-086	06/27/05	123	3150	0.1 U	0.5 U	379	6030
	90-176	09/26/05	228	2950	0.1 U	0.5 U	394	7360
MW-40-11	90-024	03/25/05	133	3150	0.12	0.034	356	6500
	90-118	07/01/05	139	3180	0.1 U	0.036	422	6780
	90-203	09/29/05	187	3030	0.1 U	0.1 U	419	7760
MW-40-13	90-014	03/23/05	140	4150	0.239	0.01 U	405	7250
	90-116	07/01/05	144	3730	0.339	0.01 U	431	8930
	90-201	09/29/05	139	3620	0.182	0.1 U	449	9080
MW-40-14	90-005	03/22/05	219	600	2.8	0.011	392	1990
	90-043	04/26/05	186	795	0.1 U	0.1 U	261	2120
	90-063	05/24/05	620	659	0.1 U	0.1 U	158	2380
	90-090	06/27/05	720	535	0.1 U	0.1 U	169	2340
	90-132	07/26/05	797	497	0.0859 J	0.1 U	188	2630
	90-151	08/22/05	1260	445	0.1 U	1 U	159	7190
	90-179	09/26/05	1610	389	0.1 U	0.5 U	138	4280
MW-40-15	90-016	03/24/05	288	450	3.49	0.01 U	290	1590
	90-106	06/30/05	292	420	3.67	0.1 U	263	1590
	90-196	09/28/05	282	423	3.67	0.1 U	242	1720

TABLE 5-5

SUMMARY OF LABORATORY ANALYTICAL RESULTS – GEOCHEMISTRY PARAMETERS

Sample Location	Sample No.	Sample Date	Alkalinity mg/L	Chloride mg/L	Nitrate as N mg/L	Nitrite as N mg/L	Sulfate mg/L	TDS mg/L
MW-40-17	90-017	03/24/05	306	235	4.93	0.01 U	233	1080
	90-104	06/29/05	290	203	5.3	0.1 U	161	1010
	90-195	09/28/05	279	255	5.42	0.1 U	177	1230
MW-40-19	90-012	03/23/05	130	200	2.79	0.01 U	117	620
	90-095	06/28/05	179	164	2.42	0.12	112	685
	90-181	09/27/05	152	148	2.79	0.1 U	101	630
MW-40-20	90-011	03/23/05	145	4500	0.205	0.01 U	461	7750
	90-115	07/01/05	1070	3530	0.1 U	0.01 U	156	9480
	90-182	09/27/05	2360	2440	0.1 U	0.1 U	6.11	10200
MW-40-22	90-004	03/22/05	1470	270	0.1 U	0.01 U	61.6	2230
	90-042	04/25/05	1400	257	0.1 U	0.1 U	54.7	2290
	90-062	05/24/05	1360	294	0.1 U	0.1 U	67.9	2510
	90-089	06/27/05	1390	289	0.1 U	0.1 U	56.8	2140
	90-131	07/26/05	1380	326	0.1 U	0.1 U	74	2210
	90-150	08/22/05	1360	280	0.1 U	1 U	66.4	2130
	90-178	09/26/05	1300	287	0.1 U	0.5 U	66	2120
MW-40-30	90-022	03/24/05	238	225	0.512	0.225	149	860
	90-050	04/27/05	291	210	4.31	0.1 U	199	810
	90-070	05/25/05	249	200	0.1 U	0.1 U	129	840
	90-100	06/29/05	254	195	0.1 U	0.1 U	59	725
	90-140	07/27/05	255	186	0.072 J	0.1 U	114	820
	90-166	08/24/05	274	184	0.1 U	0.1 U	130	845
	90-190	09/28/05	289	173	0.346	0.1 U	137	885
MW-40-31	90-020	03/24/05	145	2950	0.419	0.027	513	8010
	90-051	04/27/05	2210	2610	0.1 U	0.1 U	283	11200
	90-071	05/25/05	3450	2040	0.1 U	0.1 U	29.4	12100
	90-117	07/01/05	1730	1890	1.02	0.053	7.21	10500
	90-141	07/27/05	3330	1820	0.99	0.5 U	1.81	10400
	90-167	08/24/05	3510	1520	0.1 U	1 U	0.469 J	10800
	90-191	09/28/05	3660	1520	0.1 U	0.1 U	0.5 U	11000
MW-40-32	90-019	03/24/05	211	210	1.32	0.274	119	875
	90-052	04/27/05	231	207	1.7	0.1 U	130	795
	90-072	05/25/05	220	202	0.1 U	0.1 U	104	956
	90-101	06/29/05	380	164	0.1 U	0.1 U	0.986	875
	90-143	07/27/05	387	161	0.1 U	0.1 U	1.97	845
	90-168	08/24/05	460	161	0.1 U	0.1 U	2.04	875
	90-193	09/28/05	528	156	0.1 U	0.1 U	31.5	865
MW-40-33	90-010	03/23/05	118	75	2.13	0.089	210	365
	90-044	04/26/05	110	50.5	1.47	0.1 U	54.2	270
	90-064	05/24/05	100	52	1.46	0.1 U	56.7	310
	90-091	06/27/05	83	30	0.861	0.118	30.6	320
	90-133	07/26/05	100	98.9	0.104	0.1 U	72.2	430
	90-152	08/22/05	95.3	88.8	0.505	0.1 U	73.9	380
	90-184	09/27/05	112	111	1.46	0.179	85.1	470
MW-40-34	90-009	03/23/05	223	185	3.2	0.262	158	685
	90-045	04/26/05	306	331	3.27	0.1 U	217	1330
	90-065	05/24/05	308	330	0.62	0.1 U	229	1330
	90-094	06/28/05	426	192	0.1 U	0.1 U	72.7	1210
	90-134	07/26/05	486	231	0.5 U	0.5 U	64.9	880
	90-153	08/22/05	353	323	0.429	0.1 U	216	1300
	90-185	09/27/05	391	247	0.249	0.1 U	195	1190
MW-40-35	90-006	03/22/05	193	2350	0.65	0.044	360	5150
	90-046	04/26/05	2720	875	0.472	0.1 U	223	12700
	90-066	05/26/05	4290	1930	0.1 U	0.1 U	51.4	25000
	90-114	07/01/05	5800	205	0.1 U	0.067	25.7	23300
	90-135	07/26/05	5590	231	0.1 U	1 U	24.3	22400
	90-155	08/22/05	5640	283	0.2 U	1 U	20	28600
	90-186	09/27/05	5910	253	0.1 U	0.1 U	16	19300

TABLE 5-5

SUMMARY OF LABORATORY ANALYTICAL RESULTS – GEOCHEMISTRY PARAMETERS

Sample Location	Sample No.	Sample Date	Alkalinity mg/L	Chloride mg/L	Nitrate as N mg/L	Nitrite as N mg/L	Sulfate mg/L	TDS mg/L
MW-40-36	90-007	03/22/05	191	340	0.81	0.2	209	1080
	90-047	04/26/05	206	273	2.2	0.1 U	190	1100
	90-067	05/25/05	208	307	2.14	0.1 U	196	1170
	90-098	06/29/05	219	305	0.823	0.1 U	178	1150
	90-137	07/27/05	213	390	1.06	0.1 U	185	1130
	90-157	08/23/05	201	349	1.2	0.5 U	170	1200
	90-187	09/27/05	188	353	0.968	0.1 U	165	1140
MW-40-37	90-008	03/22/05	249	440	1.76	0.453	275	1440
	90-048	04/26/05	256	372	0.1 U	0.1 U	263	1340
	90-068	05/25/05	238	464	0.1 U	0.1 U	284	1560
	90-099	06/29/05	262	401	0.1 U	0.1 U	267	1520
	90-139	07/27/05	257	427	0.1 U	0.1 U	282	1530
	90-161	08/23/05	266	416	0.5 U	0.5 U	276	1540
	90-188	09/27/05	246	422	0.1 U	0.1 U	289	1490
MW-40-38	90-023	03/25/05	173	430	3.36	0.095	115	840
	90-053	04/27/05	206	218	4.11	0.1 U	116	815
	90-073	05/26/05	197	237	3.97	0.1 U	103	920
	90-109	06/30/05	194	247	3.78	0.1 U	106	880
	90-146	07/29/05	192	261	2.84	0.1 U	98.7	1010
	90-165	08/24/05	201	268	3.05	0.5 U	105	925
	90-202	09/29/05	201	241	4.01	0.1 U	128	935
MW-40-39	90-015	03/23/05	261	750	4.94	0.182	400	2120
	90-049	04/28/05	268	708	6.11	0.1 U	363	2410
	90-069	05/26/05	259	686	6.12	0.1 U	397	2150
	90-107	06/30/05	292	651	5.88	0.1 U	374	2180
	90-148	07/29/05	231	682	4.9	0.1 U	356	2450
	90-160	08/23/05	238	716	4.52	0.5 U	337	2100
	90-198	09/29/05	221	665	4.34	0.1 U	318	2300

Notes:
J - estimated value
mg/L - milligrams per liter
TDS - total dissolved solids
U - not detected at or below reporting limit

TABLE 5-6

SUMMARY OF LABORATORY ANALYTICAL RESULTS – BIOGENIC GASSES

Sample Location	Sample No	Sample Date	CO_2 µg/L	Dissolved Hydrogen nM	H_2S µg/L	Methane µg/L
HydroPunch - Temporary Groundwater Monitoring Wells						
HP-1	90-085	06/08/05	21000	NA	NA	8.1
HP-2	90-082	06/08/05	37000	NA	NA	5.7
HP-3	90-083	06/08/05	37000	NA	NA	5.4
HP-4	90-084	06/08/05	33000	NA	NA	6.4
HP-5	90-081	06/08/05	29000	NA	NA	4.8
Injection Wells						
IW-6	90-129	07/06/05	280000	410	18500	6400
	90-170	08/30/05	580000	NA	NA	3900
IW-7	90-128	07/06/05	100000	180	6910	160
IW-8	90-122	07/05/05	730000	11	1.25	530
	90-171	08/30/05	770000	NA	NA	580
IW-9	90-120	07/05/05	770000	6.7	1.41	4700
IW-12	90-127	07/06/05	190000	1.6	1850	5300
IW-13	90-125	07/05/05	85000	1.5	6570	1100
	90-172	08/30/05	430000	NA	NA	1300
IW-14	90-123	07/05/05	150000	6.8	246	2100
IW-17	90-124	07/05/05	160000	4.8	0.42 U	3500
IW-18	90-158	08/23/05	73000	NA	NA	7500
Groundwater Monitoring Wells						
MW-40-01	90-026	03/25/05	18000	1.2	0.42 U	1.5
	90-111	06/30/05	20000	1.7	0.42 U	1.2 U
	90-205	09/30/05	33000	1.8	0.42 U	1.2 U
MW-40-02	90-027	03/25/05	52000	1.4	0.42 U	280
	90-058	04/27/05	64000	1.4	0.42 U	120
	90-075	05/26/05	72000	100	0.42 U	33
	90-112	06/30/05	57000	1.4	0.42 U	9.1
	90-145	07/29/05	49000	4.2	0.42 U	4.9
	90-162	08/23/05	36000	3.4	0.42 U	190
	90-206	09/30/05	45000	1.9	0.42 U	2000
MW-40-06	90-002	03/21/05	13000	1.5	0.42 U	560
	90-087	06/27/05	40000	1.7	0.42 U	250
	90-177	09/26/05	21000	2.6	0.42 U	420
MW-40-07	90-013	03/23/05	22000	0.88	0.42 U	1.2 U
	90-079	05/26/05	29000	NA	NA	1.2 U
	90-108	06/30/05	28000	1	NA	1.2 U
	90-147	07/29/05	33000	NA	0.42 U	930
	90-159	08/23/05	26000	NA	NA	160
	90-200	09/29/05	37000	1.4	0.42 U	43
MW-40-08	90-018	03/24/05	25000	1.2	0.42 U	0.77 J
	90-103	06/29/05	42000	1.9	0.42 U	1.2 U
	90-194	09/28/05	32000	1.9	0.42 U	1.2 U
MW-40-10	90-001	03/21/05	17000	1	0.42 U	49
	90-086	06/27/05	19000	1.8	0.42 U	110
	90-176	09/26/05	19000	1.9	0.42 U	79
MW-40-11	90-024	03/25/05	15000	1.4	0.42 U	58
	90-118	07/01/05	21000	2.4	0.42 U	51
	90-203	09/29/05	18000	2.1	0.42 U	23
MW-40-13	90-014	03/23/05	23000	1.1	0.42 U	1.2 U
	90-116	07/01/05	32000	4.7	0.42 U	55
	90-201	09/29/05	27000	1.9	0.42 U	5.6

TABLE 5-6

SUMMARY OF LABORATORY ANALYTICAL RESULTS – BIOGENIC GASSES

Sample Location	Sample No	Sample Date	CO_2 µg/L	Dissolved Hydrogen nM	H_2S µg/L	Methane µg/L
MW-40-14	90-005	03/22/05	14000	0.74	0.42 U	6300
	90-043	04/26/05	100000	17	0.42 U	7000
	90-063	05/24/05	220000	47	0.42 U	10000
	90-090	06/27/05	360000	1.5	0.42 U	8200
MW-40-14	90-132	07/26/05	500000	2.2	0.42 U	10000
	90-151	08/22/05	680000	2	2.39	8900
	90-179	09/26/05	760000	2.4	12.5	10000
MW-40-15	90-016	03/24/05	26000	1.2	0.42 U	1.1 J
	90-106	06/30/05	44000	0.95	0.42 U	8.7
	90-196	09/28/05	44000	1.2	0.42 U	44
MW-40-17	90-017	03/24/05	23000	0.5	0.42 U	320
	90-104	06/29/05	31000	1.4	0.42 U	120
	90-195	09/28/05	29000	2.4	0.42 U	950
MW-40-19	90-012	03/23/05	8000	0.58	0.42 U	0.99 J
	90-095	06/28/05	14000	2.3	0.42 U	32
	90-181	09/27/05	11000	2.5	0.42 U	0.75 J
MW-40-20	90-011	03/23/05	22000	1	0.42 U	1.2 U
	90-115	07/01/05	180000	99	395	2.2
	90-182	09/27/05	1000000	2	1290	11000
MW-40-22	90-004	03/22/05	320000	0.8	0.42 U	6700
	90-042	04/25/05	310000	0.93	0.42 U	6800
	90-062	05/24/05	220000	2.1	0.42 U	11000
	90-089	06/27/05	400000	1.9	0.42 U	6600
	90-131	07/26/05	310000	2.1	0.633	11000
	90-150	08/22/05	270000	1.4	0.42 U	8800
	90-178	09/26/05	150000	2.6	3.1	11000
MW-40-30	90-022	03/24/05	9100	1.1	0.42 U	2.7
	90-050	04/27/05	16000	1.2	0.42 U	1 J
	90-070	05/25/05	4200	69000	0.42 U	1700
	90-100	06/29/05	2900	1300	0.42 U	1600
	90-140	07/27/05	5300	4.2	0.42 U	1200
	90-166	08/24/05	27000	0.96 J	0.42 U	6100
	90-190	09/28/05	78000	1.9	1.11	13000
MW-40-31	90-020	03/24/05	12000	1.9	0.42 U	2.9
	90-051	04/27/05	770000	170	0.967	60
	90-071	05/25/05	1500000	13000	14.7	72
	90-117	07/01/05	970000	3.4	1.44	110
	90-141	07/27/05	890000	4.9	0.42 U	220
	90-167	08/24/05	750000	1.4	0.42 U	840
	90-191	09/28/05	780000	3	0.42 U	11000
MW-40-32	90-019	03/24/05	7300	1.4	0.42 U	12
	90-052	04/27/05	8600	5.4	0.42 U	1.2 J
	90-072	05/25/05	59000	20000	0.42 U	370
	90-101	06/29/05	14000	23	0.42 U	130
	90-143	07/27/05	36000	4.6	0.42 U	4900
	90-168	08/24/05	240000	1.3	0.42 U	7900
	90-193	09/28/05	240000	2.1	0.42 U	12000

TABLE 5-6

SUMMARY OF LABORATORY ANALYTICAL RESULTS – BIOGENIC GASSES

Sample Location	Sample No	Sample Date	CO_2 µg/L	Dissolved Hydrogen nM	H_2S µg/L	Methane µg/L
MW-40-33	90-010	03/23/05	2000	1.2	0.42 U	1.8
	90-044	04/26/05	1900	15	0.42 U	1.5
	90-064	05/24/05	1600	2.1	0.42 U	1.7
	90-091	06/27/05	2500	1900	0.42 U	3.2
	90-133	07/26/05	3100	1900	0.42 U	4.6
	90-152	08/22/05	3600	25	0.42 U	1.9
	90-184	09/27/05	6300	2.7	0.42 U	1.2 J
MW-40-34	90-009	03/23/05	5100	1.2	0.42 U	19
	90-045	04/26/05	31000	1.8	0.42 U	150
	90-065	05/24/05	36000	26000	0.42 U	94
	90-094	06/28/05	170000	2.6	1.35	970
	90-134	07/26/05	82000	66	333	630
	90-153	08/22/05	45000	2.3	8.03	3500
	90-185	09/27/05	230000	1.6	0.42 U	9700
MW-40-35	90-006	03/22/05	18000	1.7	0.42 U	410
	90-046	04/26/05	760000	6400	53.7	490
	90-066	05/26/05	1300000	9300	474	150
	90-114	07/01/05	1700000	8300	3.24	140
	90-135	07/26/05	2100000	6900	12.8	2500
	90-155	08/22/05	980000	3000	200	5500
	90-186	09/27/05	1900000	270	2	6800
MW-40-36	90-007	03/22/05	9100	2.9	0.42 U	4
	90-047	04/26/05	31000	9.3	0.42 U	1.5
	90-067	05/25/05	33000	89	0.42 U	1.1 J
	90-098	06/29/05	22000	7.6	0.42 U	15
	90-137	07/27/05	24000	23	0.42 U	7.8
	90-157	08/23/05	20000	20	0.42 U	87
	90-187	09/27/05	29000	6.5	0.42 U	310
MW-40-37	90-008	03/22/05	11000	0.97	0.42 U	2.4
	90-048	04/26/05	13000	3.2	15.6	2.3
	90-068	05/25/05	15000	4.3	0.42 U	12
	90-099	06/29/05	16000	2	0.42 U	41
	90-139	07/27/05	17000	4.2	0.42 U	120
	90-161	08/23/05	16000	4.7	0.42 U	110
	90-188	09/27/05	16000	3.4	0.42 U	190
MW-40-38	90-023	03/25/05	7400	1	0.42 U	2.3
	90-053	04/27/05	10000	1.7	0.42 U	1.5
	90-073	05/26/05	11000	18	0.42 U	1.5
	90-109	06/30/05	11000	1.4	0.42 U	1.4
	90-146	07/29/05	9700	1.9	0.42 U	1.6
	90-165	08/24/05	10000	3.6	0.42 U	1.3
	90-202	09/29/05	11000	1.6	0.42 U	5.1
MW-40-39	90-015	03/23/05	15000	0.97	0.42 U	1.8
	90-049	04/28/05	20000	NA	NA	1.1 J
	90-069	05/26/05	27000	NA	0.42 U	0.78 J
	90-107	06/30/05	25000	1.2	0.42 U	1.2 U
	90-148	07/29/05	33000	NA	NA	1.2 U
	90-160	08/23/05	23000	NA	NA	1.2 U
	90-198	09/29/05	21000	1.7	0.42 U	1.2 U

Notes:

µg/L - micrograms per liter
CO_2 - carbon dioxide
H_2S - hydrogen sulfide
J - estimated value
NA - not available
nM - nanomoles
U - not detected at or below reporting limit

TABLE 5-7

SUMMARY OF LABORATORY ANALYTICAL RESULTS – MICROBIOLOGICAL PARAMETERS

Sample Location	Sample Number	Sample Date	DHC cells/mL	Biomass cells/mL	Firmicutes Anaerobic Gram Neg/(TerBrSats) (% total PLFA)	Proteobacteria (Monos) (% total PLFA)	Anaerobic metal reducers (BrMonos) (% total PLFA)	SRBs/Actinomycetes (MidBrSats) (% total PLFA)	General (Nsats) (% total PLFA)	Eukaryotes (% total PLFA)	Slowed Growth cy/cis	Decreased Permeability trans/cis
Injection Wells												
IW-5	90-039	4/11/2005	2.04E+05	2.74E+06	16.6	32.8	6.4	3.2	40.1	1	0.22	0.19
IW-6	90-129	7/6/2005	<9.9E-01	4.09E+06	16	53.82	1.3	2.01	26.81	0.07	2.35	0.11
	90-170	8/30/2005	1.95E+04									
IW-7	90-128	7/6/2005	2.28E+02	3.49E+06	22	49.04	4.63	1.86	22.36	0.11	0.18	0.13
IW-8	90-122	7/5/2005	1.91E+02	5.40E+05	26.44	34.64	5.36	0.85	32.03	0.68	0.13	0.15
	90-171	8/30/2005	6.69E+02									
IW-9	90-120	7/5/2005	5.74E+02	5.20E+05	25.8	35.44	5.42	0.77	32.51	0.07	0.08	0.12
IW-12	90-127	7/6/2005	2.30E+02	7.83E+06	26.31	46.32	3.12	4.35	19.7	0.19	0.09	0.18
IW-13	90-125	7/5/2005	3.43E+04	6.00E+05	32.22	42.62	3.82	3.52	17.67	0.17	0.37	0.11
	90-172	8/30/2005	2.08E+04									
IW-14	90-123	7/5/2005	1.86E+03	5.60E+05	30.34	37.54	2.42	1.12	28.29	0.29	0.43	0.2
IW-17	90-124	7/5/2005	3.67E+02	5.80E+05	34.3	29.66	2.96	2.87	29.99	0.21	0.27	0.16
IW-19	90-174	9/12/2005	2.90E+02									
Groundwater Monitoring Wells												
40-MW-01	90-026	3/25/2005	<5.13E-01	3.71E+03	7	38	0	9.4	40	5.5	0.56	0
	90-111	6/30/2005	1.11E+02	4.22E+04	11.76	10.53	0	2.11	73.88	1.72	1.16	0
	90-205	09/30/05	2.51E+00	3.23E+05	1.01	85.96	0	0.33	11.91	0.79	0.07	0.58
40-MW-02	90-027	3/25/2005	<5.21E-01	1.69E+05	5.5	67.6	0.8	10.5	14.4	1.3	0.14	0.14
	90-058	4/27/2005	1.26E+03	5.57E+04	3.77	64.79	1.49	0	18.46	11.49	0.38	0.1
	90-075	5/26/2005	1.36E+01	1.21E+05	9.48	43.28	1.24	20.47	22.86	2.67	0	0.05
	90-112	6/30/2005	3.57E+00	8.55E+04	6.67	52.77	0.98	20.17	15.8	3.58	0.44	0.11
	90-145	7/29/2005	1.78E+00	3.91E+04	6.58	52.87	0.87	22.2	15.99	1.49	0.44	0.07
	90-162	8/23/2005	9.28E+01	3.37E+04	7.8	52.88	1.93	8.54	17.23	11.63	0.37	0.08
	90-206	9/30/2005	1.26E+00	1.64E+05	3.76	75.46	0.56	8.84	8.97	2.41	0.16	0.1
MW-40-06	90-002	3/21/2005	1.18E+01	2.29E+05	2.9	87.2	0.3	4.7	4.7	0.2	0.22	0.28
	90-087	6/27/2005	<4.99E-01	3.75E+04	3.7	82.35	0.38	7.09	5.34	1.15	0	0.29
	90-177	9/26/2005	2.16E+00	5.56E+04	9.52	53.86	1.09	19.16	13.52	2.82	0.19	0.15
MW-40-07	90-013	3/23/2005	2.63E+00	1.40E+03	0	48.7	0	0	44.7	6.6	1.45	0
	90-108	6/30/2005	3.36E+00	6.03E+03	15.4	37.29	0	6.82	38.33	2.17	0.37	0
	90-200	9/29/2005	5.79E+00	5.03E+03	11.57	43.76	2.95	11.07	27.47	3.18	1.61	0
MW-40-08	90-018	3/24/2005	2.17E+00	1.80E+03	0	46.1	0	0	53.9	0	1.08	0
	90-103	6/29/2005	<4.88E-01	7.71E+03	12.49	28.15	0	4.71	46.22	8.44	0.87	0
	90-194	9/28/2005	2.35E+00	9.03E+03	12.84	42.14	2.01	2.7	36.87	3.43	0.78	0
MW-40-10	90-001	3/21/2005	6.56E+01	6.36E+04	6.7	57.7	1.5	18.4	15.2	0.5	0.39	0.31
	90-086	6/27/2005	<5.11E-01	4.07E+04	4.22	68.7	1.11	5.96	17.5	2.52	0	0.15
	90-176	9/26/2005	4.74E+01	4.41E+04	6.51	47.96	1.07	28.3	14.9	1.24	0.29	0.21
MW-40-11	90-024	3/25/2005	8.75E-01	3.69E+04	8	64.3	2.8	1.9	16.6	6.4	0.13	0.02
	90-118	7/1/2005	<4.84E-01	5.00E+05	10.8	30.86	4.39	10.63	35.9	7.42	1.61	0
	90-203	9/29/2005	1.42E+01	4.89E+03	8.98	32.92	0	24.26	28.71	5.12	1.84	0

TABLE 5-7

SUMMARY OF LABORATORY ANALYTICAL RESULTS – MICROBIOLOGICAL PARAMETERS

Sample Location	Sample Number	Sample Date	DHC cells/mL	Biomass cells/mL	Firmicutes Anaerobic Gram Neg/(TerBrSats) (% total PLFA)	Proteobacteria (Monos) (% total PLFA)	Anaerobic metal reducers (BrMonos) (% total PLFA)	SRBs/Actinomycetes (MidBrSats) (% total PLFA)	General (Nsats) (% total PLFA)	Eukaryotes (% total PLFA)	Slowed Growth cy/cis	Decreased Permeability trans/cis
MW-40-13	90-014	3/23/2005	5.42E+00	6.12E+03	15.3	37.9	1.2	7.8	33.8	3.9	1.18	0
	90-116	7/1/2005	5.34E+00	4.60E+05	12.82	27.12	14.55	0	37.04	8.46	0	0
	90-201	9/29/2005	1.08E+00	4.75E+03	6.06	35.71	0	9.17	28.51	20.53	2.45	0
MW-40-14	90-005	3/22/2005	1.91E+02	1.64E+05	1.7	91.4	0.2	2.6	4.2	0	0.31	0.25
	90-043	4/26/2005	2.10E+02	1.70E+06	6.7	70.71	0.43	1.3	20.21	0.64	0.07	0.09
	90-063	5/24/2005	8.26E+01	8.49E+05	17.05	57.2	1.74	1.86	22.04	0.11	0.09	0.15
	90-090	6/27/2005	5.08E+01	1.95E+05	18.74	54.17	1.67	2.06	23.23	0.11	0.12	0.21
	90-132	7/26/2005	3.01E+04	9.12E+05	14.47	56.14	1.75	3.43	24.07	0.15	0.08	0.14
	90-151	8/22/2005	2.28E+04	1.34E+06	18.83	43.52	3.98	3.13	30.32	0.19	0.57	0.24
	90-179	9/26/2005	9.34E+04	1.67E+06	25.93	38.1	4.37	1.99	29.33	0.24	0.15	0.35
MW-40-15	90-016	3/24/2005	2.29E+01	2.06E+04	9.2	48.5	2	10.3	28.4	1.6	1.14	0.38
	90-106	6/30/2005	1.06E+02	3.32E+04	6.05	59.44	0.48	3.93	19.92	10.16	0.11	0.77
	90-196	9/28/2005	4.34E+00	5.14E+03	1.99	54.27	0	20.57	20.55	2.62	0.49	0
MW-40-17	90-017	3/24/2005	7.86E-01	1.62E+05	4.5	70.1	0.1	7.3	17.8	0.3	0.11	0
	90-104	6/29/2005	7.54E+01	1.61E+04	6.41	63.02	0	5.29	19.27	5.99	1.13	0.47
	90-195	9/28/2005	1.82E+00	5.04E+04	3.71	71.33	0.44	9.2	12.55	2.78	0.25	0
MW-40-19	90-012	3/23/2005	6.75E-01	5.91E+04	5.9	66	2.5	6.1	13.9	5.6	0.3	0.12
	90-095	6/28/2005	6.44E+01	8.94E+04	8.04	45.95	2.1	24.47	17.06	2.37	0.36	0.13
	90-181	9/27/2005	9.30E+00	3.70E+04	18.5	38.56	2.91	8.58	29.45	1.99	0.6	0.24
MW-40-20	90-011	3/23/2005	9.94E+00	1.73E+03	0	38.7	0	17.6	43.7	0	1.24	0
	90-115	7/1/2005	5.94E+00	4.40E+05	15.67	51.63	0.42	1.13	30.84	0.3	0.09	0.42
	90-182	9/27/2005	1.57E+00	1.18E+06	14.91	52.69	0.14	1.29	30.81	0.13	0.08	0.19
MW-40-22	90-004	3/22/2005	1.29E+03	2.35E+06	22	49.8	5.3	3.2	19.6	0.2	0.09	0.05
	90-042	4/25/2005	2.72E+04	2.30E+06	30.06	37.99	5.62	4.97	20.74	0.62	0.12	0.07
	90-062	5/24/2005	9.04E+03	1.69E+06	28.3	40.5	5.14	5.48	20.15	0.42	0.14	0.06
	90-089	6/27/2005	4.71E+03	3.57E+05	23.46	49	3.73	3.44	19.91	0.44	0.17	0.07
	90-131	7/26/2005	2.96E+04	1.63E+06	24.05	48.05	3.62	3.41	20.44	0.43	0.26	0.16
	90-150	8/22/2005	3.13E+03	2.94E+06	16.78	59.92	2.61	2.58	17.02	1.09	0.24	0.15
	90-178	9/26/2005	7.67E+03	2.57E+06	18.38	55.73	2.79	2.81	19.27	1.02	0.21	0.13
MW-40-30	90-022	3/24/2005	<4.85E-01	2.20E+04	7.3	55.9	3.4	1.5	14.8	17.1	0.08	0.04
	90-050	4/27/2005	<4.94E-01	9.69E+03	0	44.01	3.93	0	16.92	35.14	0.22	0
	90-070	5/25/2005	2.82E+01	9.10E+05	4.72	69.02	1.11	1.23	23.45	0.46	0.04	0.07
	90-100	6/29/2005	<5.81E-01	2.60E+05	18.42	50.86	7.81	4.52	18.08	0.31	0.06	0.11
	90-140	7/27/2005	2.73E+00	4.05E+05	6.58	63.75	2.65	2.43	23.97	0.62	0.06	0.06
	90-166	8/24/2005	1.02E+01	1.08E+06	3.17	79.45	0.6	1.06	13.52	2.21	0.07	0.19
	90-190	9/28/2005	2.63E+01	9.74E+05	3.27	79.47	0.36	0.86	15.76	0.25	0.05	0.08
MW-40-31	90-020	3/24/2005	<5E-01	5.48E+04	14.3	58.2	1.5	1.5	23	1.4	0.06	0.06
	90-051	4/27/2005	2.53E+00	3.90E+06	19.21	32.69	11.39	4.16	32.33	0.25	0.02	0.08
	90-071	5/25/2005	4.24E+01	1.88E+06	12.69	52.43	2.44	1.24	31.15	0.06	0.05	0.26
	90-117	7/1/2005	<4.81E-01	4.80E+05	16.74	52.41	2.34	1.09	27.41	0	0.37	0.37
	90-141	7/27/2005	5.45E+01	5.60E+05	17.41	51.04	2.06	1.12	27.77	0.61	0.31	0.2

TABLE 5-7

SUMMARY OF LABORATORY ANALYTICAL RESULTS – MICROBIOLOGICAL PARAMETERS

Sample Location	Sample Number	Sample Date	DHC cells/mL	Biomass cells/mL	Firmicutes Anaerobic Gram Neg/(TerBrSats) (% total PLFA)	Proteobacteria (Monos) (% total PLFA)	Anaerobic metal reducers (BrMonos) (% total PLFA)	SRBs/Actinomycetes (MidBrSats) (% total PLFA)	General (Nsats) (% total PLFA)	Eukaryotes (% total PLFA)	Slowed Growth cy/cis	Decreased Permeability trans/cis
MW-40-31	90-167	8/24/2005	5.43E+03	5.68E+05	20.62	44.35	1.79	0.74	32.11	0.4	0.29	0.21
	90-191	9/28/2005	2.74E+04	7.30E+05	25.67	41.16	2.55	0.72	29.46	0.47	0.3	0.16
MW-40-32	90-019	3/24/2005	<5E-01	6.33E+04	13.8	61.9	2.3	1.3	15.6	5.1	0.32	0.06
	90-052	4/27/2005	1.07E+02	2.77E+04	7.8	53.94	4.21	2.83	18.01	13.21	0.2	0.1
	90-072	5/25/2005	9.77E+00	1.91E+06	6.37	66.2	3.41	1.42	22.38	0.23	0.03	0.08
	90-101	6/29/2005	<5.05E-01	2.31E+05	16.05	56.38	4.25	3.04	20.14	0.13	0.02	0.11
	90-143	7/27/2005	1.47E+01	1.37E+06	11.89	63.09	2.18	1.5	20.84	0.48	0.06	0.07
	90-168	8/24/2005	1.07E+06	1.42E+06	8.96	70.42	1.01	0.39	18.86	0.34	0.05	0.05
	90-193	9/28/2005	6.54E+03	7.67E+05	14.3	58.99	1.83	3.04	21.51	0.31	0.06	0.08
MW-40-33	90-010	3/23/2005	2.95E+00	4.49E+04	10.6	55.8	3.5	4.3	17.9	7.8	0.1	0.03
	90-044	4/26/2005	4.87E+00	3.17E+04	10.03	35.84	3.03	3.03	21.1	26.97	0.79	0
	90-064	5/24/2005	2.72E+01	6.13E+04	26.52	41.85	3.61	2.06	22.86	3.11	0.27	0.11
	90-091	6/27/2005	6.45E+00	4.92E+04	9.22	57.91	1.88	2.65	25.12	3.24	0.33	0.02
	90-133	7/26/2005	1.49E+02	2.42E+05	11.37	60.33	1.32	3.12	22.62	1.24	0.34	0.06
	90-152	8/22/2005	3.65E+01	1.98E+05	10.67	57.02	1.77	4.74	23.99	1.84	0.52	0.07
	90-184	9/27/2005	5.58E+01	1.09E+05	18.36	48.01	1.64	5.83	24.16	1.97	0.68	0.09
MW-40-34	90-009	3/23/2005	2.44E+00	1.26E+05	13.1	53.7	3.7	3.5	16.1	10	0.18	0.07
	90-045	4/26/2005	6.84E+01	2.90E+04	3.62	32.06	2.06	11.87	21.1	29.29	0.42	0
	90-065	5/24/2005	1.89E+02	7.66E+05	2.18	76.23	0.59	1.07	18.9	1.02	0.03	0.04
	90-094	6/28/2005	1.11E+00	1.60E+05	12.33	61.85	3.13	3.77	18.75	0.17	0.02	0.08
	90-134	7/26/2005	2.01E+02	1.81E+06	8.37	71.49	1.45	1.5	16.9	0.33	0.02	0.11
	90-153	8/22/2005	8.03E+01	5.25E+05	7.33	65.17	1.86	0.97	23.47	1.19	0.17	0.07
	90-185	9/27/2005	7.55E+01	9.57E+05	9.94	66.15	1.39	1.45	20.52	0.56	0.09	0.09
MW-40-35	90-006	3/22/2005	6.11E+01	3.14E+05	7.2	74.5	1.6	1.1	14.9	0.6	0.21	0.08
	90-046	4/26/2005	8.72E+01	5.69E+06	42.32	35.35	0.39	0.35	35.97	0.2	0.47	0.89
	90-066	5/26/2005	4.34E+01	6.89E+06	13.86	36.69	0.22	0.23	48.15	0.88	1.3	0.57
	90-096 discarded	6/28/2005	discarded									
	90-114	7/1/2005	<1.14E+00	4.20E+05	20.43	29.78	0.14	0.28	49.29	0.07	0.78	1.65
	90-135	7/26/2005	2.40E+00	3.15E+06	14.71	31.56	0.53	0.3	52.8	0.08	1.48	2.31
	90-155	8/22/2005	4.79E+01	2.93E+06	9.95	38.5	0.22	0.23	51.06	0.06	0.73	0.99
	90-186	9/27/2005	1.33E+01	1.74E+06	15.46	32.79	0.34	0.29	50.75	0.35	0.85	1.16
MW-40-36	90-007	3/22/2005	1.04E+00	1.20E+05	6.4	66.2	4	1.5	17.8	4.1	0.28	0.08
	90-047	4/26/2005	1.66E+01	1.10E+04	0	68.29	6.49	0	16.58	8.65	1.48	0
	90-067	5/25/2005	3.70E+01	4.97E+04	10.54	59.66	2.11	2.51	22.19	2.99	0.07	0.02
	90-098	6/29/2005	7.43E+01	1.03E+05	10.74	63.02	2.76	2.12	19.6	1.78	0.21	0.15
	90-137	7/27/2005	1.33E+03	7.50E+04	13.94	46.65	5.13	5.78	26.02	2.48	0.5	0.14
	90-157	8/23/2005	1.42E+03	2.50E+04	10.62	42.17	4.25	9.6	29.12	4.25	1.2	0.21
	90-187	9/27/2005	2.72E+03	5.50E+04	11.59	53.82	2.59	4.99	25.61	1.4	0.6	0.14
MW-40-37	90-008	3/22/2005	8.08E-01	1.03E+05	10.2	59.6	3.4	1.6	20.9	4.4	0.53	0.07
	90-048	4/26/2005	<6.99E-01	1.03E+06	11.04	64.68	1.48	0.82	21	0.99	0.12	0.13
	90-068	5/25/2005	8.04E-01	5.48E+05	16.9	57.27	2.39	1.53	21.66	0.24	0.19	0.11

TABLE 5-7

SUMMARY OF LABORATORY ANALYTICAL RESULTS – MICROBIOLOGICAL PARAMETERS

Sample Location	Sample Number	Sample Date	DHC cells/mL	Biomass cells/mL	Firmicutes Anaerobic Gram Neg/(TerBrSats) (% total PLFA)	Proteobacteria (Monos) (% total PLFA)	Anaerobic metal reducers (BrMonos) (% total PLFA)	SRBs/Actinomycetes (MidBrSats) (% total PLFA)	General (Nsats) (% total PLFA)	Eukaryotes (% total PLFA)	Slowed Growth cy/cis	Decreased Permeability trans/cis
MW-40-37	90-099	6/29/2005	<4.93E-01	2.92E+05	14.42	57.35	2.46	1.54	23.26	0.96	0.22	0.18
	90-139	7/27/2005	3.19E+01	1.63E+05	11.51	59	2.72	1.81	23.21	1.75	0.33	0.14
	90-161	8/23/2005	1.46E+02	1.02E+05	10.19	58.75	2.62	2.35	24.56	1.54	0.46	0.14
	90-188	9/27/2005	8.93E+01	3.26E+05	13.58	60.64	1.98	2.28	20.59	0.95	0.37	0.15
MW-40-38	90-023	3/25/2005	3.31E+00	1.11E+04	3.1	68.5	1.8	9.4	15.3	1.9	0.29	0
	90-053	4/27/2005	5.08E+00	1.10E+04	0	39.9	7.97	7.19	16.49	28.46	0.7	0
	90-073	5/26/2005	3.75E+00	1.61E+04	9.74	57.31	3.72	0	26.82	2.42	0.14	0.07
	90-109	6/30/2005	8.62E+01	8.89E+03	12.53	40.77	3.14	6.12	28.45	9	0.67	0
	90-146	7/29/2005	5.33E+01	8.25E+03	8.87	49.14	4.94	6.67	21.89	8.49	2.27	0
	90-165	8/24/2005	1.05E+03	9.14E+04	11.69	39.91	3.54	8.29	23.92	12.65	1.05	0
	90-202	9/29/2005	3.82E+02	3.11E+03	2.69	48.85	5.61	3.12	26.96	12.77	0.69	0
MW-40-39	90-015	3/23/2005	<5.1E-01	6.16E+04	14.6	54.6	4.1	2.5	20.5	3.7	0.12	0.02
	90-107	6/30/2005	4.15E+02	1.88E+04	20.33	35.13	7.67	7.23	28.4	1.24	0.05	0.15
	90-198	9/29/2005	6.47E+02	1.31E+04	12.45	46.45	3.9	5.34	26.23	5.65	1.19	0.25

Notes:

DHC - *Dehalococcoides ethenogenes* spp.

mL - milliliter

PLFA - phospholipid fatty acid

SRB - sulfate-reducing bacteria

TABLE 5-8

SUMMARY OF LABORATORY ANALYSIS RESULTS – CATIONS

Sample Location	Sample No.	Sample Date	Calcium mg/L	Iron mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L
HydroPunch - Temporary Groundwater Monitoring Wells							
HP-1	90-085	06/08/05	168 J	2.09	59.3	13	416
HP-2	90-082	06/08/05	174 J	0.917	63.4	8.85	374
HP-3	90-083	06/08/05	108 J	164	91.9	42	375
HP-4	90-084	06/08/05	186 J	2.03	65.8	13.7	463
HP-5	90-081	06/08/05	86.6 J	2.03	31.5	8.5	295
Injection Wells							
IW-6	90-129	07/06/05	47.4	2.32	19	5 U	484
IW-7	90-128	07/06/05	23.5	0.36	10.7	5 U	377
IW-8	90-122	07/05/05	42.7	19.9	20.7	4.48 J	1650
IW-9	90-120	07/05/05	43.5	27	12.1	2.99 J	1830
IW-12	90-127	07/06/05	29.2	1.52	8.13	3.28 J	434
IW-13	90-125	07/05/05	88.7	1.55	40	2.98 J	408
IW-14	90-123	07/05/05	13.3	1.42	7.38	5 U	559
IW-17	90-124	07/05/05	5.79	3.95	5 U	5 U	485
IW-18	90-158	08/23/05	131	0.154	55.4	19.9	313
Groundwater Monitoring Wells							
MW-40-01	90-026	03/25/05	19.2	0.0712 J	7.73	5 U	196 J
	90-111	06/30/05	26.8	0.0487 J	10.5	5 U	179
	90-205	09/30/05	53.9	0.1 U	18.5	5 U	198
MW-40-02	90-027	03/25/05	54	0.776	20.5	5 U	181 J
	90-058	04/27/05	59.5	4.05	23	2.32 J	182
	90-075	05/26/05	60.7	0.0558 J	22.1	2.68 J	170
	90-112	06/30/05	59.8	0.0728 J	21.9	2.06 J	171
	90-145	07/29/05	61.6	0.129	22.4	5 U	175
	90-162	08/23/05	64.9	0.138	22.5	4.34 J	174
	90-206	09/30/05	67.3	0.158	24.5	5 U	188
MW-40-06	90-002	03/21/05	123	0.1 U	40	4.44 J	271
	90-087	06/27/05	138	0.1 U	46.8	4.73 J	324
	90-177	09/26/05	118	0.1 U	39.6	5.37	302
MW-40-07	90-013	03/23/05	148	0.1 U	40.9	5.08	278
	90-079	05/26/05	172	0.1 U	46.6	6.35	304
	90-108	06/30/05	168	0.1 U	44.2	4.28 J	288
	90-147	07/29/05	174	0.1 U	43.9	3.41 J	293
	90-159	08/23/05	189	0.1 U	48.2	6.96	303
	90-200	09/29/05	178	0.1 U	44.8	7.33	311
MW-40-08	90-018	03/24/05	105	0.1 U	31.3	2.73 J	237 J
	90-103	06/29/05	97.3	0.1 U	31.2	5 U	251
	90-194	09/28/05	93.2	0.1 U	28.9	5 U	237
MW-40-10	90-001	03/21/05	589	0.483	229	13.4	608
	90-086	06/27/05	660	0.826	322	15.2	805
	90-176	09/26/05	589	0.569	248	13.9	650
MW-40-11	90-024	03/25/05	762	0.0532 J	281	15.8	836 J
	90-118	07/01/05	785	0.0801 J	270	16.1	1040
	90-203	09/29/05	765	0.503	277	17.1	969
MW-40-13	90-014	03/23/05	674	0.1 U	404	13.5	1210
	90-116	07/01/05	691	0.1 U	376	14.2	1380
	90-201	09/29/05	630	0.1 U	419	14	1010

TABLE 5-8

SUMMARY OF LABORATORY ANALYSIS RESULTS – CATIONS

Sample Location	Sample No.	Sample Date	Calcium mg/L	Iron mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L
MW-40-14	90-005	03/22/05	266	0.136	61.6	5.54	247
	90-043	04/26/05	315	4.43	72.1	5.89	237
	90-063	05/24/05	355	9.16	87.4	5.33	262
	90-090	06/27/05	127	9.99	36.5	4.52 J	632
	90-132	07/26/05	382	14.3	95.8	6.55	308
	90-151	08/22/05	348	17.6	84.3	7.43	605
	90-179	09/26/05	332	26.8	82.2	9.43	772
MW-40-15	90-016	03/24/05	196	0.1 U	60.5	4.88 J	240 J
	90-106	06/30/05	197	0.1 U	61	4.93 J	237
	90-196	09/28/05	197	0.1 U	63.4	5.22	265
MW-40-17	90-017	03/24/05	129	0.1 U	32.3	3.75 J	167 J
	90-104	06/29/05	137	0.1 U	33.7	5.18	174
	90-195	09/28/05	167	0.1 U	40.2	3.83 J	177
MW-40-19	90-012	03/23/05	47.6	0.0671 J	13	5 U	166
	90-095	06/28/05	51.1	0.0988 J	14.5	2.3 J	187
	90-181	09/27/05	49	0.056 J	12.9	3.26 J	156
MW-40-20	90-011	03/23/05	805	0.1 U	372	20.2	1470
	90-115	07/01/05	782	0.843	368	13.5	1620
	90-182	09/27/05	1040	28.9	318	20.3	1520
MW-40-22	90-004	03/22/05	28.6	5.22	11.5	3.93 J	814
	90-042	04/25/05	48.3	9.84	19.3	3.54 J	838
	90-062	05/24/05	43	9.71	16.6	3.78 J	737
	90-089	06/27/05	47.9	11	18	4.32 J	806
	90-131	07/26/05	50.8	11.7	18.8	3.15 J	780
	90-150	08/22/05	50.5	10.9	18	4.64 J	709
	90-178	09/26/05	51.1	11.2	18.2	4.16 J	756
MW-40-30	90-022	03/24/05	78.6	0.1	25.4	7.9	211 J
	90-050	04/27/05	77.6	0.1 U	22.7	6.12	185
	90-070	05/25/05	67.9	0.1 U	20.4	4.94 J	191
	90-100	06/29/05	63.8	0.0581 J	18	4.2 J	208
	90-140	07/27/05	78	0.134	20.6	3.97 J	186
	90-166	08/24/05	83.9	0.0614 J	22	5.38	185
	90-190	09/28/05	88.6	0.366	24.1	3.84 J	197
MW-40-31	90-020	03/24/05	620	0.0674 J	292	13.4	1130 J
	90-051	04/27/05	936	11.8	402	12.2	1300
	90-071	05/25/05	965	31.1	411	11.5	1620
	90-117	07/01/05	1100	52.9	417	11.2	1700
	90-141	07/27/05	1060	67.7	391	11.3	1430
	90-167	08/24/05	1260	105	406	11.7	1530
	90-191	09/28/05	1370	140	393	11	3090
MW-40-32	90-019	03/24/05	70.4	0.052 J	26.2	9.4	186 J
	90-052	04/27/05	74.9	0.1 U	26.7	9.1	174
	90-072	05/25/05	79.1	1.09	27	7.57	164
	90-101	06/29/05	88.9	0.239	29	5.53	166
	90-143	07/27/05	97.2	1.56	30.8	3.59 J	154
	90-168	08/24/05	104	5.12	31.2	5.78	149
	90-193	09/28/05	120	10.5	35.6	3.19 J	169

TABLE 5-8

SUMMARY OF LABORATORY ANALYSIS RESULTS – CATIONS

Sample Location	Sample No.	Sample Date	Calcium mg/L	Iron mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L
MW-40-33	90-010	03/23/05	19.3	0.0515 J	6.68	2.9 J	95.3
	90-044	04/26/05	19.1	0.1 U	5.69	2.23 J	69.2
	90-064	05/24/05	19	0.1 U	6.06	5 U	74.6
	90-091	06/27/05	24.3	0.0488 J	7.3	2.23 J	83.9
	90-133	07/26/05	40.6	0.1 U	10.9	2.26 J	99.4
	90-152	08/22/05	34.6	0.1 U	9.43	2.06 J	88.9
	90-184	09/27/05	46.9	0.1 U	12.3	2.11 J	100
MW-40-34	90-009	03/23/05	24.1	0.453	11.8	8.53	216
	90-045	04/26/05	112	0.1 U	27.6	4.49 J	243
	90-065	05/24/05	112	0.152	28.4	4.57 J	272
	90-094	06/28/05	107	6.2	29.4	4.32 J	306
	90-134	07/26/05	97.9	1.57	25.4	3.77 J	282
	90-153	08/22/05	135	0.777	31.9	3.7 J	287
	90-185	09/27/05	113	2.23	27.2	4.9 J	270
MW-40-35	90-006	03/22/05	496	0.301	181	16.6	834
	90-046	04/26/05	874	21.7	193	15.7	2010
	90-066	05/26/05	637	57.4	122	15.8	4600
	90-114	07/01/05	518	84.1	94.4	14.5	5280
	90-135	07/26/05	428	79.8	79.1	14.7	4790
	90-155	08/22/05	554	120	113	15.1	4500
	90-186	09/27/05	788	119	104	19	3360
MW-40-36	90-007	03/22/05	75	0.181	35.4	12.1	250
	90-047	04/26/05	120	0.1 U	34.6	6.2	194
	90-067	05/25/05	128	0.1 U	34.6	4.26 J	175
	90-098	06/29/05	125	0.0547 J	39	7.2	225
	90-137	07/27/05	121	0.0991 J	35.6	5.91	198
	90-157	08/23/05	150	0.1 U	37.5	6.57	178
	90-187	09/27/05	147	0.0655 J	35.6	4.73 J	167
MW-40-37	90-008	03/22/05	131	0.1	54.4	15.5	288
	90-048	04/26/05	137	0.0896 J	50.5	13.5	274
	90-068	05/25/05	143	0.162	51.6	12.6	264
	90-099	06/29/05	157	0.269	54.8	12.7	279
	90-139	07/27/05	167	0.27	51.7	10	261
	90-161	08/23/05	169	0.289	51.5	13.6	249
	90-188	09/27/05	180	0.304	52.3	10.6	238
MW-40-38	90-023	03/25/05	83.3	0.12	26.5	8.29	171 J
	90-053	04/27/05	81.9	0.1 U	26.8	7.35	157
	90-073	05/26/05	87.5	0.1 U	28.6	7.86	153
	90-109	06/30/05	91.6	0.0542 J	28.3	6.72	153
	90-146	07/29/05	104	0.1 U	29.6	6.59	155
	90-165	08/24/05	107	0.1 U	30.6	7.14	160
	90-202	09/29/05	102	0.1 U	31.2	4.58 J	173
MW-40-39	90-015	03/23/05	203	0.149	71.5	19.7	450
	90-049	04/28/05	218	0.1 U	63.4	12.5	400
	90-069	05/26/05	230	0.121	65.8	12.1	392
	90-107	06/30/05	238	0.1 U	65	10.2	377
	90-148	07/29/05	235	0.1 U	62.9	9.59	362
	90-160	08/23/05	252	0.1 U	66	11.1	360
	90-198	09/29/05	250	0.0861 J	64.5	9.55	373

Notes:
mg/L - milligrams per liter
J - estimated value
U - not detected at or below reporting limit

TABLE 5-9

SUMMARY OF BIOLOGICAL ACTIVITY AND REDUCTIVE DECHLORINATION IN SELECT MONITORING WELLS

		Evidence of Increasing Biological Activity and Conditions Supportive of Reductive Dechlorination[1]												
Well	**General Location**	**PCE/TCE Decrease**	**DCE Accumulation**	**VC Generation**	**COD Increase**	**VFA Increase**	**Sulfate Reduction**	**CO_2 Production**	**CH_4 Production**	**H_2S Production**	**Reducing ORP**	**Increasing Alkalinity**	**Increasing DHC/PLFA Biomass**	**Comments and General Assessment**
MW-40-2	Upgradient edge				○				○		○			Located upgradient of all injection wells; COC levels very low; slight decrease in PCE concentration and general upward trend in COD may indicate that this well is beginning to respond to lactate injection.
MW-40-14	Plume center	●	●	○	●	●	●	●	○	○	●	●	○	Located in key area of plume; contained COCs at relatively high levels; appears to be responding reasonably well to treatment.
MW-40-22	Pilot study area				○				○	○	●			COC levels very low, PCE/TCE below MCLs, low and decreasing levels of DCE, VC, and ethene suggest reductive dechlorination in the past, process near completion.
MW-40-30	Off plume center toward cross-gradient edge	●	●		○		○	●	●	○	○	○	○	Key plume well; appears to be generally responding to treatment; expected to respond favorably to bioaugmentation.
MW-40-31	Off plume center toward cross-gradient edge	●	●	○	●	●	●	●	●	●	●	●	○	Key plume well; appears to be responding to treatment; expected to respond favorably to bioaugmentation.
MW-40-32	Off plume center toward cross-gradient edge	●	●	○	●	●	●	●	●		●	●	○	Key plume well; appears to be responding to treatment; expected to respond favorably to bioaugmentation.
MW-40-33	Cross-gradient edge				○		○	●			●		○	COCs have not been detected in this well; nevertheless, appears to be responding to lactate to some degree; not deemed crucial in performance assessment at this time.
MW-40-34	Off plume center toward cross-gradient edge	●	●		●		●	●	●	●	●	●	●	Appears to be behaving as expected in many respects; however, inconsistencies in several key parameters (COCs, COD, sulfate) suggest COC redistribution may be significant and/or substrate transport is not optimal in this area; COC rebound may be transitory.
MW-40-35	Plume center	●	●		●	●	●	●	●	●	●	●		Key plume well; appears to be responding to treatment; expected to respond favorably to bioaugmentation.
MW-40-36	Plume center		●		●		●	●	●		●			Key plume well; limited response to treatment is evident at this time; however, most recent sampling event indicates that substrate is now present; may respond respond favorably to bioaugmentation; may require recirculation to better facilitate transport of substrate and/or inoculum.
MW-40-37	Plume center	●	●		●			●	●	●	●		●	Key plume well; appears to be behaving as expected in some respects; however, inconsistencies in several key parameters (COCs, COD) suggest redistribution may be significant and/or substrate transport is not optimal in this area; COC rebound may be transitory.
MW-40-38	Cross-gradient edge				○			○	○		○		○	COCs never measured at levels above MCLs in this well; COD impacts may now be evident; not deemed crucial in performance assessment at this time.
MW-40-39	Downgradient edge				○		○	○						COCs never measured at levels above MCLs in this well; not deemed crucial in performance assessment at this time.

Notes:

DO and NO_3^- data are not included. These analytes were not detected or were detected at very low levels in all monitoring wells, which suggests that anoxic (but not strongly reducing) conditions are present site-wide.

1) Black-filled circles indicate strong evidence; gray filled circles indicate some, but less certain evidence; a blank field indicates little or no evidence

CH_4 - methane
CO_2 - carbon dioxide
COC - chemical of concern
COD - chemical oxygen demand
DCE - dichloroethene
DHC - *Dehalococcoides ethenogenes* spp.
DO - dissolved oxygen
H_2S - hydrogen sulfide
MCL - Maximum Containment Level
NO_3^- - nitrate
ORP - oxidation/reduction potential
PCE - tetrachloroethene
PLFA - phospholipid fatty acid
TCE - trichloroethene
VC - vinyl chloride
VFA - volatile fatty acid

TABLE 5-10

SUMMARY OF FIELD MONITORING RESULTS FOR METHANE AND HYDROGEN SULFIDE IN VAPOR/GAS MONITORING WELLS AND NESTED PROBES – APRIL THROUGH SEPTEMBER 2005

Well ID	Methane (percent in air) 04/26/05	Hydrogen Sulfide (ppm) 04/26/05	Methane (percent in air) 05/02/05	Hydrogen Sulfide (ppm) 05/02/05	Methane (percent is air) 06/01/05	Hydrogen Sulfide (ppm) 06/01/05	Methane (percent in air) 06/28/05	Hydrogen Sulfide (ppm) 06/28/05	Methane (percent in air) 07/27/05	Hydrogen Sulfide (ppm) 07/27/05	Methane (percent in air) 08/23/05	Hydrogen Sulfide (ppm) 08/23/05	Methane (percent is air) 09/27/05	Hydrogen Sulfide (ppm) 09/27/05
VW-40-01	77.9	0.0	78.1	0	74.3	0	70.1	0	76.2	0	72.9	0	74.6	0
VW-40-02	70.6	0.0	65.8	0	71.4	0	73.7	0	71.9	0	NM	NM	70.1	0
VW-40-03	60.5	11.0	78.9	1	0.5	0	73.7	0	75.2	0	71.8	0	74.0	0
VW-40-04	0.0	0.0	0.2	0	0.1	0	0.1	0	0.1	0	0.2	0	0.0	0
VW-40-05	0.0	0.0	0.1	0	0.2	0	0.1	0	0.1	0	0.1	0	0.0	0
VW-40-06	0.0	0.0	0.2	0	0.1	0	0.2	0	0.1	0	2.9	0	61.8	0
IW-1	58.9	0.0	59.9	0	0.2	12	57.0	0	54.1	0	37.2	0	59.2	4
IW-2	81.0	0.0	8.8	22	2.3	>200	0.8	8	23.5	3	24.3	52	27.6	78
IW-3	5.0	0.0	0.7	0	8.0	20	0.3	0	13.0	0	18.2	17	33.9	0
IW-4	0.0	0.0	0.1	0	0.1	0	0.4	0	0.1	0	18.0	67	24.7	5
IW-6	1.0	0.0	0.0	0	0.8	2	9.9	0	17.9	0	24.9	0	63.2	0
IW-7	14.7	0.0	26.7	0	0.9	25	37.6	6	40.9	1	15.2	2	84.8	6
IW-8	22.0	0.0	0.0	0	0.3	0	0.2	0	0.3	0	9.1	130	45.6	4
IW-9	1.0	0.0	NM	NM	6.1	14	5.7	7	0.1	0	39.6	12	61.8	7
IW-10	1.0	0.0	0.0	0	0.1	5	0.2	0	0.2	0	31.6	>200	74.7	21
IW-11	2.0	0.0	58.7	26	52.9	12	35.4	4	26.6	2	32.1	38	78.5	12
IW-12	16.0	0.0	40.6	0	2.5	107	26.8	172	49.6	2	44.3	>200	86.0	20
IW-13	13.0	0.0	0.2	0	0.4	20	0.1	0	0.1	0	2.9	94	4.4	0
IW-14	2.0	0.0	0.0	0	2.9	0	0.2	0	1.5	0	18.1	>200	92.8	0
IW-15	9.0	0.0	NM	NM	0.3	66	16.1	7	26.8	1	46.9	14	55.2	15
IW-16	0.0	0.0	0.0	0	0.1	0	0.2	0	0.2	0	0.2	141	8.6	175
IW-17	1.0	0.0	0.1	0	0.3	0	0.1	0	0.1	0	0.5	0	76.7	0
MW-40-30	0.0	0.0	Unable to monitor. Probe filled with water.											
MW-40-31	1.0	0.0	10.4	0	0.4	0	0.1	0	0.1	0	NM	NM	0.0	0
MW-40-32	0.0	0.0	0.2	0	0.4	140	0.4	0	0.1	0	83.6	0	89.1	0
MW-40-33	0.0	0.0	0.0	0	0.1	0	26.7	0	0.2	0	0.2	0	0.0	0
MW-40-34	0.0	0.0	0.0	0	0.8	>200	0.1	0	0.1	0	2.4	0	40.5	0
MW-40-35	52.0	0.0	25.5	0	2.1	>200	0.3	0	32.5	0	39.9	0	45.2	0
MW-40-36	2.0	0.0	0.1	0	2.3	0	0.2	0	0.1	0	22.1	0	81.5	0
MW-40-37	0.0	0.0	0.1	0	0.1	0	0.1	0	0.1	0	2.3	0	24.2	0
MW-40-38	0.0	0.0	0.1	0	0.1	0	0.6	0	0.2	0	0.3	0	0.0	0
MW-40-39	0.0	0.0	0.2	0	0.1	0	0.1	0	0.0	0	0.1	0	0.0	0

Notes:

NM - not measured

57.5

ppm - parts per million

10.4 Methane concentrations greater than lower explosive limit

TABLE 5-11

GROUNDWATER LEVEL MEASUREMENT DATA

Monitoring Well Location	Approximatelly Well Screen Interval (feet bgs)	Ground Surface Elevation (feet above msl) (NAVD 29)	Reference Point (toc) Elevation (feet above msl)	Date Measured	Depth to Water (feet)	Groundwater Elevation (feet above msl)
40-MW-01	6.5-16.5	10.09	10.09	03/25/05	7.50	2.59
				04/11/05	NM	NM
				04/18/05	NM	NM
				05/09/05	NM	NM
				06/01/05	NM	NM
				06/27/05	7.94	2.15
				07/27/05	NM	NM
				08/22/05	NM	NM
				09/26/05	7.92	2.17
40-MW-02	6-16	10.11	10.11	03/25/05	7.49	2.62
				04/11/05	NM	NM
				04/18/05	NM	NM
				05/09/05	NM	NM
				06/01/05	NM	NM
				06/27/05	NM	NM
				07/27/05	NM	NM
				08/22/05	NM	NM
				09/26/05	NM	NM
MW-40-06	20.3-30.3	11	10.57	03/25/05	8.38	2.19
				04/11/05	NM	NM
				04/18/05	8.41	2.16
				05/09/05	8.51	2.06
				06/01/05	8.54	2.03
				06/27/05	8.82	1.75
				07/27/05	8.65	1.92
				08/22/05	8.74	1.83
				09/26/05	8.79	1.78
MW-40-07	20-30	10.8	10.3	03/25/05	8.10	2.20
				04/11/05	NM	NM
				04/18/05	NM	NM
				05/09/05	NM	NM
				06/01/05	NM	NM
				06/27/05	8.75	1.55
				07/27/05	NM	NM
				08/22/05	NM	NM
				09/26/05	8.59	1.71
MW-40-08	20-31	10.7	10.32	03/25/05	8.10	2.22
				04/11/05	NM	NM
				04/18/05	NM	NM
				05/09/05	NM	NM
				06/01/05	NM	NM
				06/27/05	8.64	1.68
				07/27/05	NM	NM
				08/22/05	NM	NM
				09/26/05	8.63	1.69

TABLE 5-11

GROUNDWATER LEVEL MEASUREMENT DATA

Monitoring Well Location	Approximatelly Well Screen Interval (feet bgs)	Ground Surface Elevation (feet above msl) (NAVD 29)	Reference Point (toc) Elevation (feet above msl)	Date Measured	Depth to Water (feet)	Groundwater Elevation (feet above msl)
MW-40-10	45-55	10.94	10.28	03/25/05	8.03	2.25
				04/11/05	NM	NM
				04/18/05	8.20	2.08
				05/09/05	8.31	1.97
				06/01/05	8.3	1.98
				06/27/05	8.44	1.84
				07/27/05	8.42	1.86
				08/22/05	8.52	1.76
				09/26/05	8.58	1.70
MW-40-11	45-55	10.11	9.7	03/25/05	7.52	2.18
				04/11/05	NM	NM
				04/18/05	NM	NM
				05/09/05	NM	NM
				06/01/05	NM	NM
				06/27/05	7.96	1.74
				07/27/05	NM	NM
				08/22/05	NM	NM
				09/26/05	7.91	1.79
MW-40-13	45-55	10.7	10.27	03/25/05	7.94	2.33
				04/11/05	NM	NM
				04/18/05	NM	NM
				05/09/05	NM	NM
				06/01/05	NM	NM
				06/27/05	8.75	1.52
				07/27/05	NM	NM
				08/22/05	NM	NM
				09/26/05	8.62	1.65
MW-40-14	30-40	10.9	10.67	03/25/05	8.43	2.24
				04/11/05	8.66	2.01
				04/18/05	8.64	2.03
				05/09/05	8.57	2.1
				06/01/05	8.73	1.94
				06/27/05	8.08	2.59
				07/27/05	8.83	1.84
				08/22/05	8.98	1.69
				09/26/05	9.10	1.57
MW-40-15	20-30	10.9	10.46	03/25/05	8.38	2.08
				04/11/05	NM	NM
				04/18/05	NM	NM
				05/09/05	NM	NM
				06/01/05	NM	NM
				06/27/05	8.85	1.61
				07/27/05	NM	NM
				08/22/05	NM	NM
				09/26/05	8.81	1.65

TABLE 5-11

GROUNDWATER LEVEL MEASUREMENT DATA

Monitoring Well Location	Approximatelly Well Screen Interval (feet bgs)	Ground Surface Elevation (feet above msl) (NAVD 29)	Reference Point (toc) Elevation (feet above msl)	Date Measured	Depth to Water (feet)	Groundwater Elevation (feet above msl)
MW-40-17	20-30	9.88	9.73	03/25/05	7.60	2.13
				04/11/05	NM	NM
				04/18/05	NM	NM
				05/09/05	NM	NM
				06/01/05	NM	NM
				06/27/05	8.10	1.63
				07/27/05	NM	NM
				08/22/05	NM	NM
				09/26/05	8.17	1.56
MW-40-19	19.8-29.8	10.2	11.73	03/25/05	9.40	2.33
				04/11/05	NM	NM
				04/18/05	NM	NM
				05/09/05	NM	NM
				06/01/05	NM	NM
				06/27/05	10.10	1.63
				07/27/05	NM	NM
				08/22/05	NM	NM
				09/26/05	9.99	1.74
MW-40-20	49.7-59.7	10.26	12.04	03/25/05	9.88	2.16
				04/11/05	NM	NM
				04/18/05	9.98	2.06
				05/09/05	10.2	1.84
				06/01/05	10.13	1.91
				06/27/05	10.50	1.54
				07/27/05	10.29	1.75
				08/22/05	10.38	1.66
				09/26/05	10.38	1.66
MW-40-22	15.3-35.5	10.93	10.58	03/25/05	8.26	2.32
				04/11/05	8.48	2.10
				04/18/05	NM	NM
				05/09/05	8.36	2.22
				06/01/05	8.51	2.07
				06/27/05	7.76	2.82
				07/27/05	8.62	1.96
				08/22/05	8.72	1.86
				09/26/05	8.76	1.82
MW-40-30	15-35	10.99	10.35	03/25/05	7.62	2.73
				04/11/05	7.75	2.60
				04/18/05	7.72	2.63
				05/09/05	7.42	2.93
				06/01/05	7.81	2.54
				06/27/05	8.08	2.27
				07/27/05	7.91	2.44
				08/22/05	8.01	2.34
				09/26/05	8.09	2.26

TABLE 5-11

GROUNDWATER LEVEL MEASUREMENT DATA

Monitoring Well Location	Approximatelly Well Screen Interval (feet bgs)	Ground Surface Elevation (feet above msl) (NAVD 29)	Reference Point (toc) Elevation (feet above msl)	Date Measured	Depth to Water (feet)	Groundwater Elevation (feet above msl)
MW-40-31	42-52	10.75	10.57	03/25/05	8.30	2.27
				04/11/05	8.47	2.10
				04/18/05	8.40	2.17
				05/09/05	8.46	2.11
				06/01/05	8.5	2.07
				06/27/05	8.83	1.74
				07/27/05	8.62	1.95
				08/22/05	8.74	1.83
				09/26/05	8.75	1.82
MW-40-32	15-35	10.48	10.2	03/25/05	7.80	2.40
				04/11/05	7.98	2.22
				04/18/05	7.92	2.28
				05/09/05	8	2.2
				06/01/05	8.01	2.19
				06/27/05	8.32	1.88
				07/27/05	8.15	2.05
				08/22/05	8.21	1.99
				09/26/05	8.32	1.88
MW-40-33	15-35	10.97	10.6	03/25/05	8.00	2.60
				04/11/05	8.31	2.29
				04/18/05	8.16	2.44
				05/09/05	8.26	2.34
				06/01/05	8.29	2.31
				06/27/05	8.61	1.99
				07/27/05	8.42	2.18
				08/22/05	8.57	2.03
				09/26/05	8.51	2.09
MW-40-34	15-35	10.92	10.23	03/25/05	7.42	2.81
				04/11/05	7.67	2.56
				04/18/05	7.54	2.69
				05/09/05	7.52	2.71
				06/01/05	7.62	2.61
				06/27/05	7.93	2.30
				07/27/05	7.77	2.46
				08/22/05	7.9	2.33
				09/26/05	7.89	2.34
MW-40-35	45-55	11.16	10.78	03/25/05	8.24	2.54
				04/11/05	8.48	2.30
				04/18/05	8.41	2.37
				05/09/05	8.51	2.27
				06/01/05	8.51	2.27
				06/27/05	8.84	1.94
				07/27/05	8.64	2.14
				08/22/05	8.73	2.05
				09/26/05	8.77	2.01

TABLE 5-11

GROUNDWATER LEVEL MEASUREMENT DATA

Monitoring Well Location	Approximatelly Well Screen Interval (feet bgs)	Ground Surface Elevation (feet above msl) (NAVD 29)	Reference Point (toc) Elevation (feet above msl)	Date Measured	Depth to Water (feet)	Groundwater Elevation (feet above msl)
MW-40-36	15-34	11.17	10.92	03/25/05	8.58	2.34
				04/11/05	8.79	2.13
				04/18/05	8.64	2.28
				05/09/05	8.7	2.22
				06/01/05	8.75	2.17
				06/27/05	9.06	1.86
				07/27/05	8.85	2.07
				08/22/05	8.97	1.95
				09/26/05	9.00	1.92
MW-40-37	15-35	10.96	10.56	03/25/05	8.10	2.46
				04/11/05	8.27	2.29
				04/18/05	8.26	2.30
				05/09/05	8.24	2.32
				06/01/05	8.27	2.29
				06/27/05	8.57	1.99
				07/27/05	8.39	2.17
				08/22/05	8.45	2.11
				09/26/05	8.51	2.05
MW-40-38	15-35	9.98	9.62	03/25/05	7.20	2.42
				04/11/05	7.22	2.40
				04/18/05	7.28	2.34
				05/09/05	7.3	2.32
				06/01/05	7.34	2.28
				06/27/05	7.62	2.00
				07/27/05	7.41	2.21
				08/22/05	7.52	2.1
				09/26/05	8.11	1.51
MW-40-39	15-35	10.64	10.4	03/25/05	8.20	2.20
				04/11/05	8.33	2.07
				04/18/05	8.20	2.20
				05/09/05	8.36	2.04
				06/01/05	8.29	2.11
				06/27/05	8.65	1.75
				07/27/05	8.43	1.97
				08/22/05	8.49	1.91
				09/26/05	8.54	1.86
IW-1	15-35	11.98	11.48	03/25/05	NM	NM
				04/11/05	9.15	2.33
				04/18/05	8.04	3.44
				05/09/05	8.93	2.55
				06/01/05	9.09	2.39
				06/27/05	9.32	2.16
				07/27/05	9.16	2.32
				08/22/05	9.28	2.2
				09/26/05	9.30	2.18

TABLE 5-11

GROUNDWATER LEVEL MEASUREMENT DATA

Monitoring Well Location	Approximatelly Well Screen Interval (feet bgs)	Ground Surface Elevation (feet above msl) (NAVD 29)	Reference Point (toc) Elevation (feet above msl)	Date Measured	Depth to Water (feet)	Groundwater Elevation (feet above msl)
IW-2	15-35	11.31	10.6	03/25/05	NM	NM
				04/11/05	8.15	2.45
				04/18/05	8.12	2.48
				05/09/05	8.11	2.49
				06/01/05	8.17	2.43
				06/27/05	8.31	2.29
				07/27/05	8.09	2.51
				08/22/05	8.37	2.23
				09/26/05	8.36	2.24
IW-3	15-35	11.17	10.81	03/25/05	NM	NM
				04/11/05	8.53	2.28
				04/18/05	8.52	2.29
				05/09/05	8.46	2.35
				06/01/05	8.56	2.25
				06/27/05	8.88	1.93
				07/27/05	8.68	2.13
				08/22/05	8.81	2
				09/26/05	8.80	2.01
IW-4	15-35	10.97	10.51	03/25/05	NM	NM
				04/11/05	8.10	2.41
				04/18/05	8.10	2.41
				05/09/05	8.2	2.31
				06/01/05	8.18	2.33
				06/27/05	8.45	2.06
				07/27/05	8.27	2.24
				08/22/05	8.39	2.12
				09/26/05	8.49	2.02
IW-5*	15.1-35.1	10.98	10.52	03/25/05	NM	NM
				04/11/05	8.50	2.02
				04/18/05	8.46	2.06
				05/09/05	8.53	1.99
				06/01/05	8.64	1.88
				06/27/05	7.76	2.76
				07/27/05	8.59	1.93
				08/22/05	8.69	1.83
				09/26/05	8.73	1.79
IW-6	15-35	11.33	10.93	03/25/05	NM	NM
				04/11/05	8.57	2.36
				04/18/05	8.56	2.37
				05/09/05	8.7	2.23
				06/01/05	8.63	2.3
				06/27/05	8.92	2.01
				07/27/05	8.72	2.21
				08/22/05	8.82	2.11
				09/26/05	8.89	2.04

TABLE 5-11

GROUNDWATER LEVEL MEASUREMENT DATA

Monitoring Well Location	Approximatelly Well Screen Interval (feet bgs)	Ground Surface Elevation (feet above msl) (NAVD 29)	Reference Point (toc) Elevation (feet above msl)	Date Measured	Depth to Water (feet)	Groundwater Elevation (feet above msl)
IW-7	15-35	11.38	10.91	03/25/05	NM	NM
				04/11/05	8.50	2.41
				04/18/05	8.40	2.51
				05/09/05	8.49	2.42
				06/01/05	8.55	2.36
				06/27/05	8.82	2.09
				07/27/05	8.63	2.28
				08/22/05	8.83	2.08
				09/26/05	8.88	2.03
IW-8	15-35	11.21	10.94	03/25/05	NM	NM
				04/11/05	8.87	2.07
				04/18/05	8.84	2.10
				05/09/05	8.86	2.08
				06/01/05	8.83	2.11
				06/27/05	9.08	1.86
				07/27/05	8.86	2.08
				08/22/05	9.16	1.78
				09/26/05	9.11	1.83
IW-9	15-35	10.66	10.29	03/25/05	NM	NM
				04/11/05	8.14	2.15
				04/18/05	8.12	2.17
				05/09/05	7.96	2.33
				06/01/05	8.07	2.22
				06/27/05	7.42	2.87
				07/27/05	8.22	2.07
				08/22/05	8.37	1.92
				09/26/05	8.50	1.79
IW-10	15-35	10.55	10.32	03/25/05	NM	NM
				04/11/05	8.18	2.14
				04/18/05	8.13	2.19
				05/09/05	8.21	2.11
				06/01/05	8.2	2.12
				06/27/05	8.48	1.84
				07/27/05	8.31	2.01
				08/22/05	8.52	1.8
				09/26/05	8.45	1.87
IW-11	15-35	11.01	10.4	03/25/05	NM	NM
				04/11/05	8.00	2.40
				04/18/05	7.81	2.59
				05/09/05	7.86	2.54
				06/01/05	7.89	2.51
				06/27/05	8.16	2.24
				07/27/05	7.97	2.43
				08/22/05	8.16	2.24
				09/26/05	8.17	2.23

TABLE 5-11

GROUNDWATER LEVEL MEASUREMENT DATA

Monitoring Well Location	Approximatelly Well Screen Interval (feet bgs)	Ground Surface Elevation (feet above msl) (NAVD 29)	Reference Point (toc) Elevation (feet above msl)	Date Measured	Depth to Water (feet)	Groundwater Elevation (feet above msl)
IW-12	15-35	11.05	10.51	03/25/05	NM	NM
				04/11/05	8.56	1.95
				04/18/05	7.98	2.53
				05/09/05	7.31	3.2
				06/01/05	8.05	2.46
				06/27/05	8.32	2.19
				07/27/05	8.14	2.37
				08/22/05	8.3	2.21
				09/26/05	8.30	2.21
IW-13	15-35	10.8	10.54	03/25/05	NM	NM
				04/11/05	NM	NM
				04/18/05	8.30	2.24
				05/09/05	8.29	2.25
				06/01/05	8.35	2.19
				06/27/05	8.66	1.88
				07/27/05	8.45	2.09
				08/22/05	8.59	1.95
				09/26/05	8.68	1.86
IW-14	15-35	10.86	10.5	03/25/05	NM	NM
				04/11/05	8.42	2.08
				04/18/05	8.21	2.29
				05/09/05	8.23	2.27
				06/01/05	8.21	2.29
				06/27/05	8.52	1.98
				07/27/05	8.83	1.67
				08/22/05	8.52	1.98
				09/26/05	8.49	2.01
IW-15	15-35	10.93	10.63	03/25/05	NM	NM
				04/11/05	8.60	2.03
				04/18/05	8.14	2.49
				05/09/05	8.54	2.09
				06/01/05	8.5	2.13
				06/27/05	8.78	1.85
				07/27/05	8.57	2.06
				08/22/05	8.77	1.86
				09/26/05	8.88	1.75
IW-16	15-35	11.15	10.46	03/25/05	NM	NM
				04/11/05	8.00	2.46
				04/18/05	7.78	2.68
				05/09/05	7.87	2.59
				06/01/05	7.85	2.61
				06/27/05	8.18	2.28
				07/27/05	7.98	2.48
				08/22/05	8.16	2.3
				09/26/05	8.09	2.37

TABLE 5-11

GROUNDWATER LEVEL MEASUREMENT DATA

Monitoring Well Location	Approximatelly Well Screen Interval (feet bgs)	Ground Surface Elevation (feet above msl) (NAVD 29)	Reference Point (toc) Elevation (feet above msl)	Date Measured	Depth to Water (feet)	Groundwater Elevation (feet above msl)
IW-17	15-35	10.59	10.19	03/25/05	NM	NM
				04/11/05	8.10	2.09
				04/18/05	7.88	2.31
				05/09/05	7.32	2.87
				06/01/05	7.9	2.29
				06/27/05	8.21	1.98
				07/27/05	7.99	2.20
				08/22/05	8.11	2.08
				09/26/05	8.15	2.04

Notes:

* - IW-5 is the new designation for the pilot test monitoring well MW-40-27
bgs - below ground surface
msl - mean sea level
NAVD - North American Vertical Datum
NM - not measured
toc - top of casing

FIGURES

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DATE: 11/30/05	REV: REVISION 0		CTO: #0090	06016911.DWG

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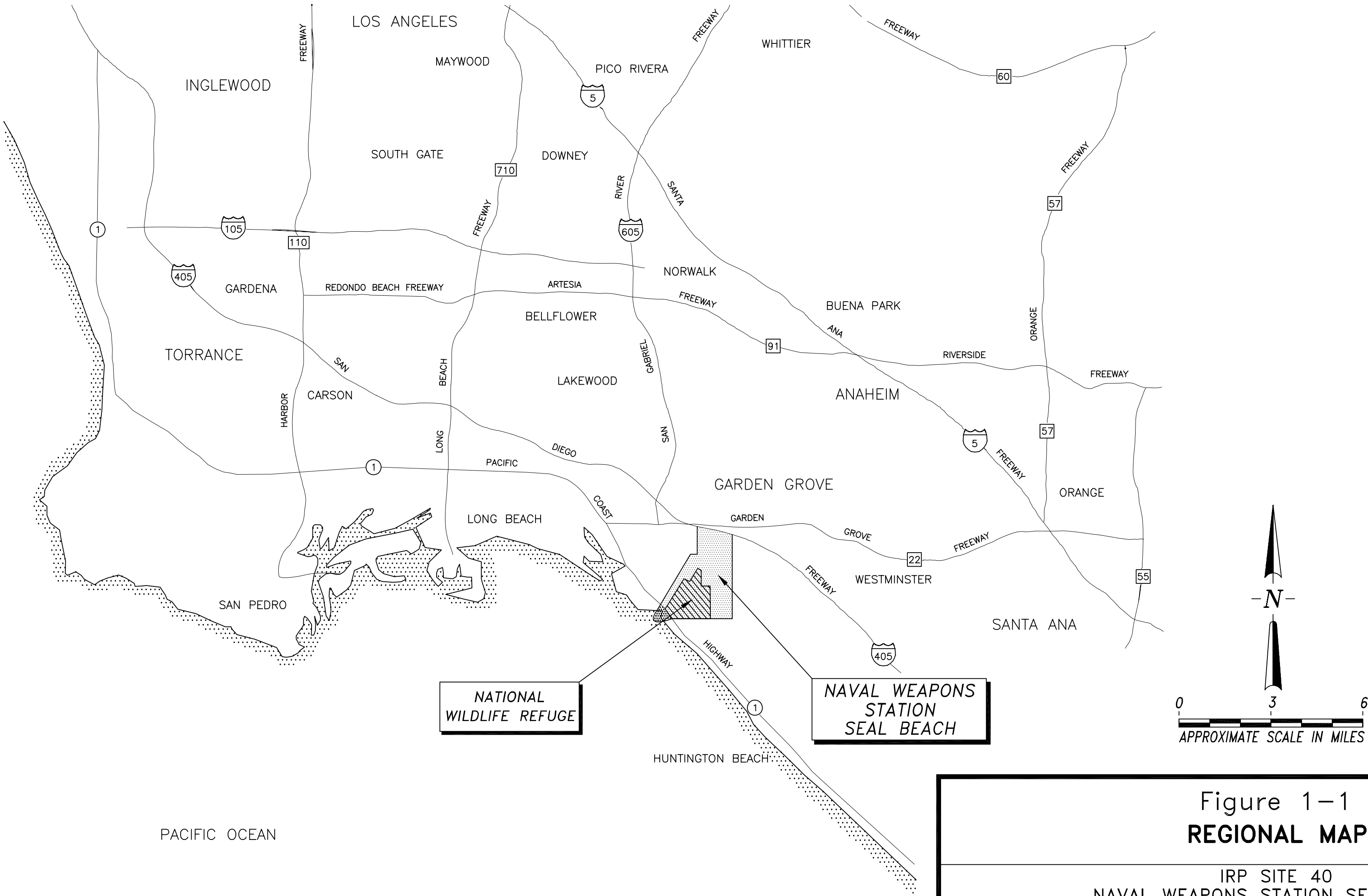

SOURCE: CH2M HILL, 2002.

Figure 1-1
REGIONAL MAP

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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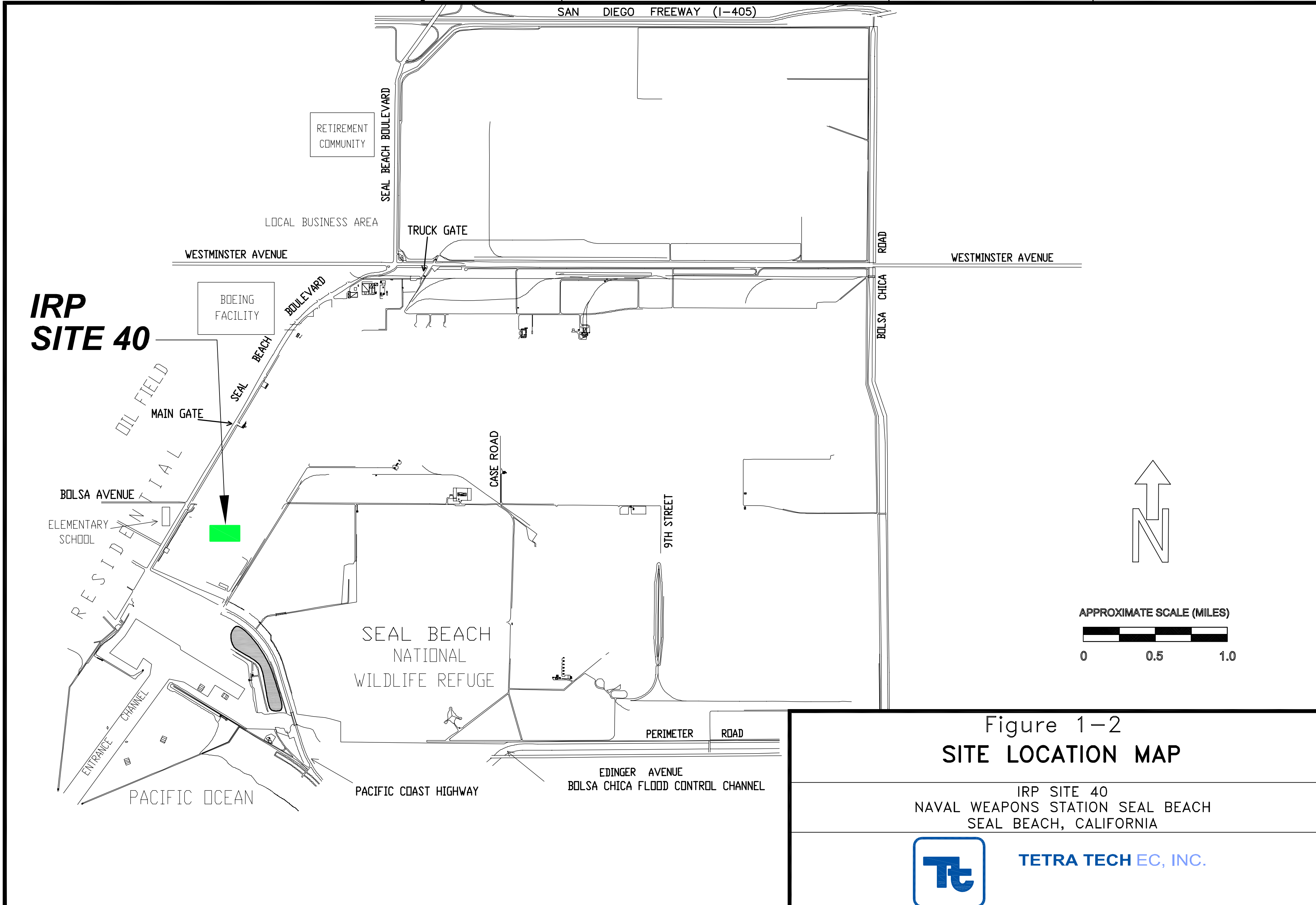

Figure 1-2

SITE LOCATION MAP

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

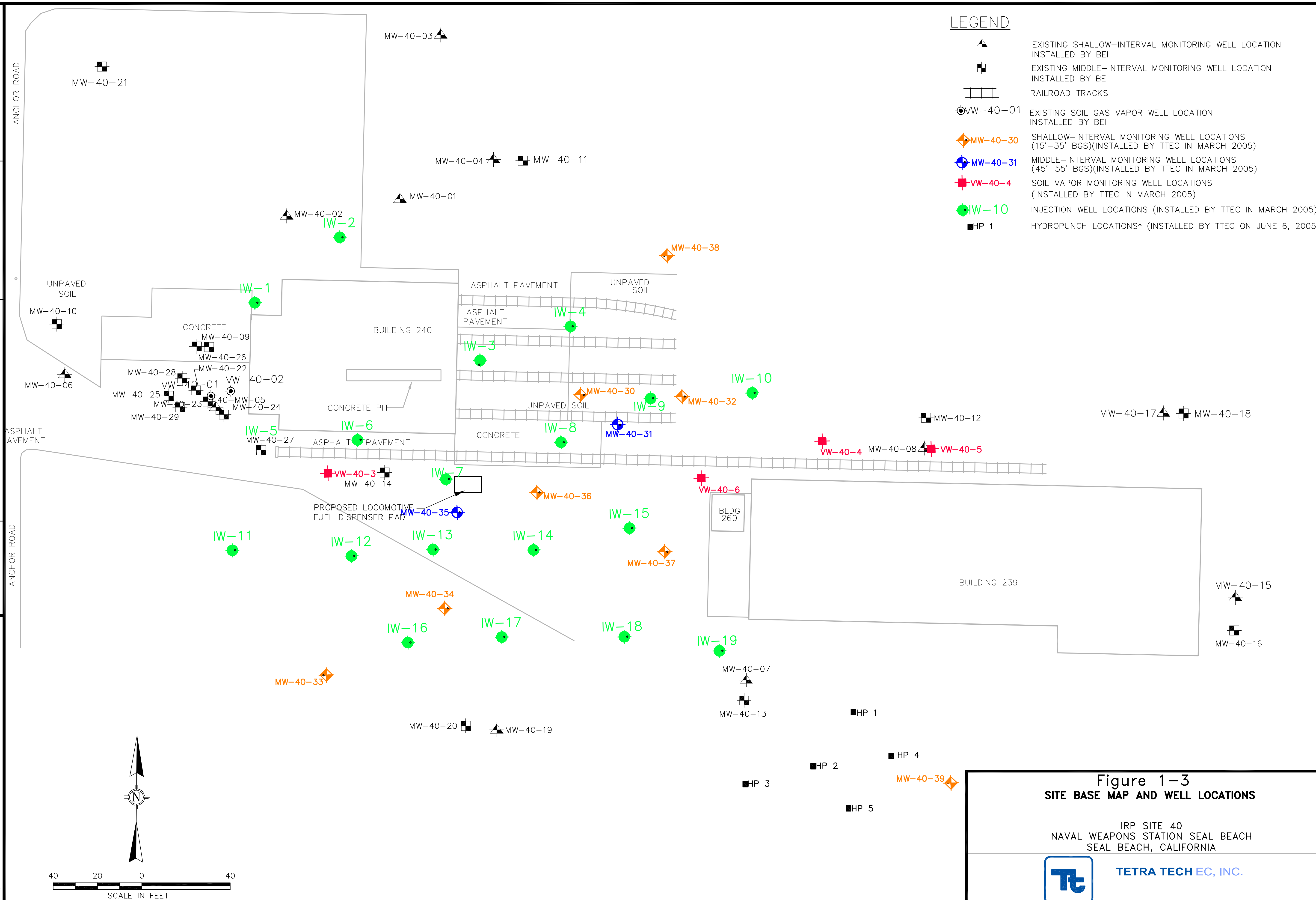

Figure 1-3
SITE BASE MAP AND WELL LOCATIONS

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 06016913.DWG
DCN: FWSD-RAC-06-0169 CTO: #0090
APPROVED BY: HH
CHECKED BY: HH REV: REVISION 0
DRAWN BY: MD DATE: 11/30/05

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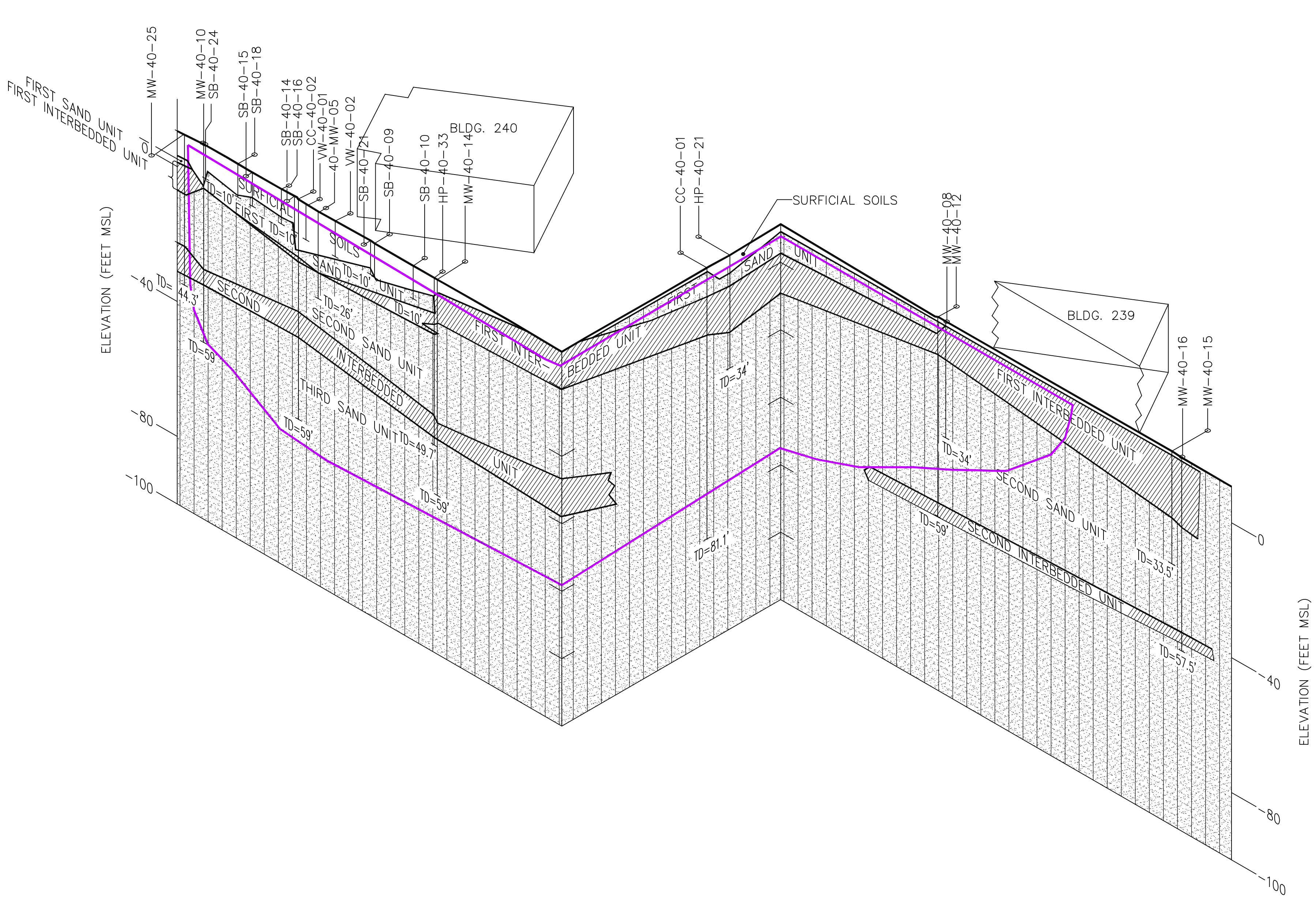

LEGEND

SUBSURFACE STRATIGRAPHIC SYMBOLS

PREDOMINANTLY FINE-GRAINED UNIT (CLAY, SILT, SILTY CLAY, CLAYEY SILT, SANDY CLAY AND SANDY SILT)

PREDOMINANTLY COARSE-GRAINED UNIT (SAND, SILTY SAND AND CLAYEY SAND)

UNIT BOUNDARY

APPROXIMATE EXTENT OF VOC PLUME IN GROUNDWATER

IR – INSTALLATION RESTORATION

SOURCE:

BECHTEL ENVIRONMENTAL, INC. 2003. FINAL SECOND ANNUAL GROUNDWATER MONITORING REPORT IR SITES 40 AND 70, NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CALIFORNIA. JULY.

0 80 160

FEET

VERTICAL SCALE: 1 INCH = 40 FEET

Figure 2–1
SITE PHYSICAL CONCEPTUAL MODEL

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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CHECKED BY: HH REV: REVISION 0
DRAWN BY: MD DATE: 10/19/05

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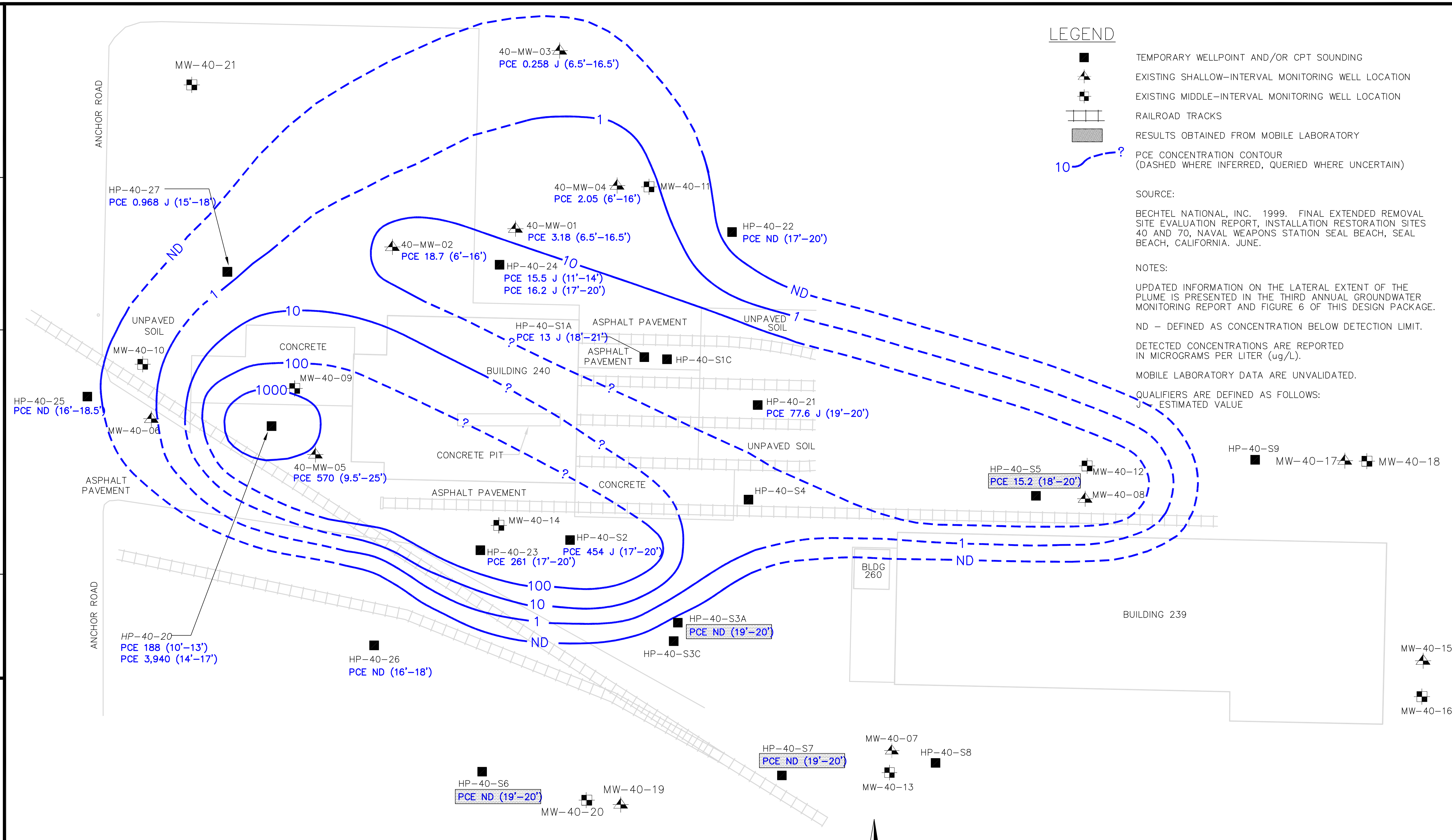

Figure 2-2
HISTORICAL PCE CONCENTRATIONS IN GROUNDWATER LESS THAN 20 FEET BGS
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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CHECKED BY: HH REV: REVISION 0
DRAWN BY: MD DATE: 11/30/05

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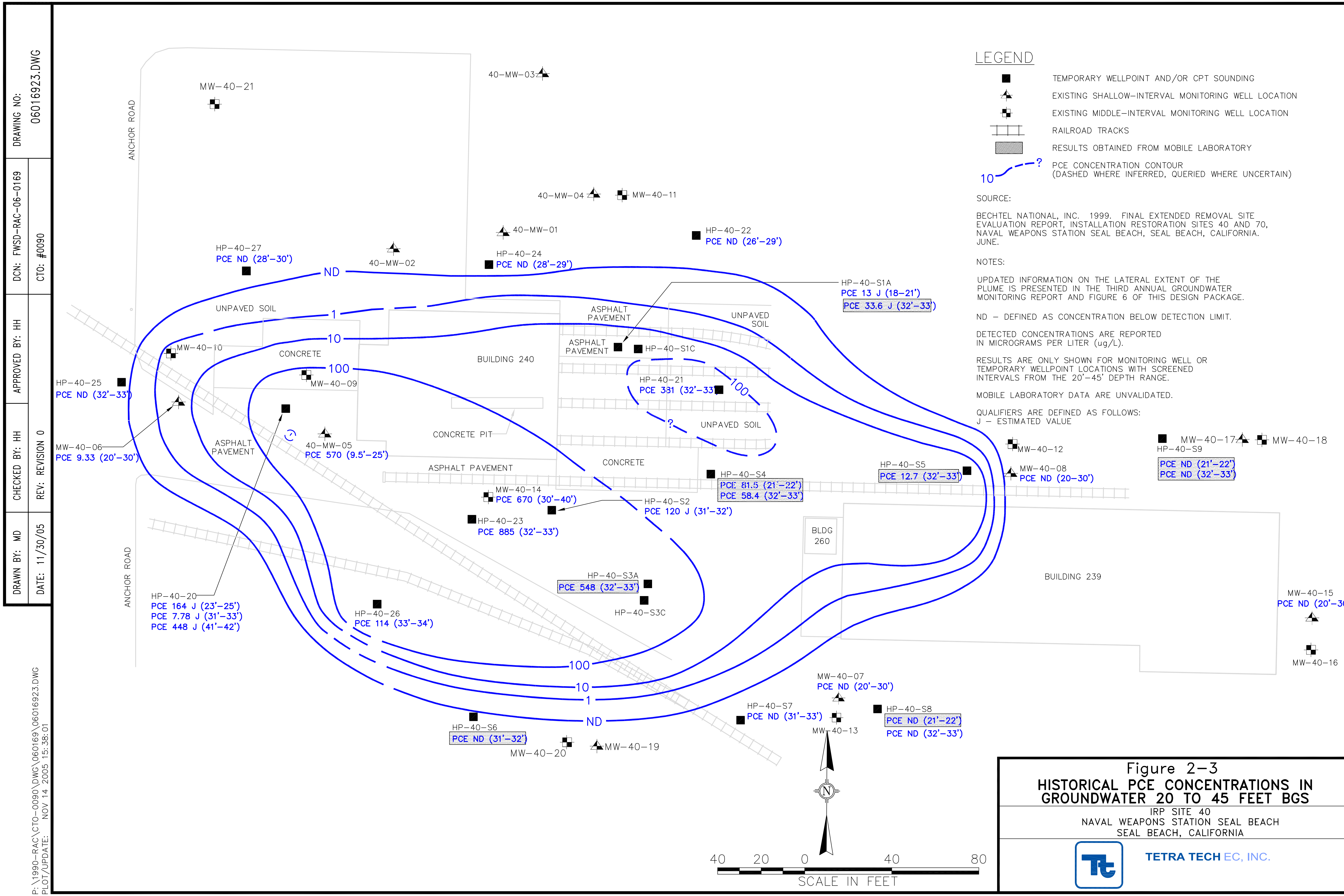
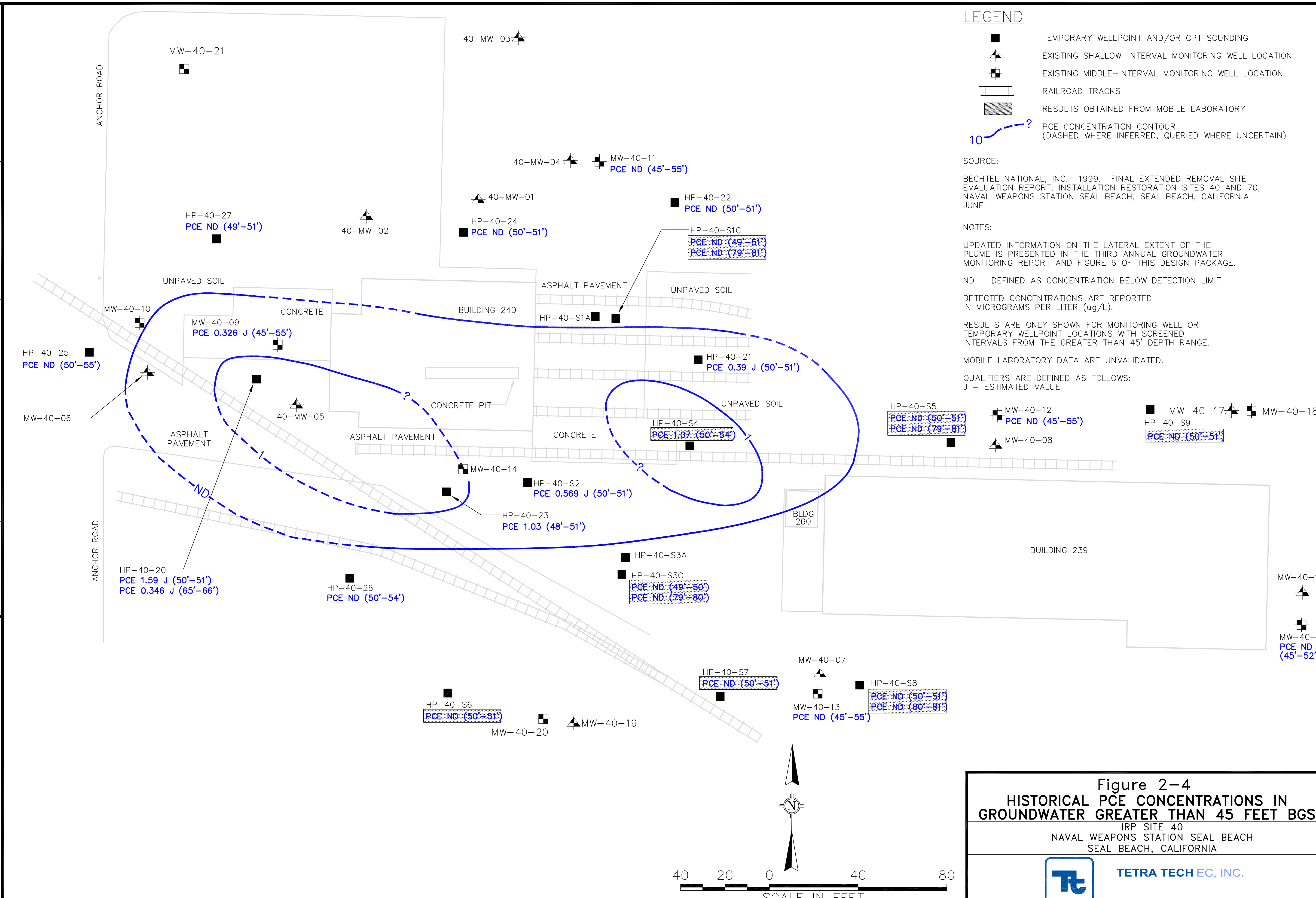


Figure 2–3
HISTORICAL PCE CONCENTRATIONS IN GROUNDWATER 20 TO 45 FEET BGS
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.



LEGEND

- TEMPORARY WELLPOINT AND/OR CPT SOUNDING
- EXISTING SHALLOW-INTERVAL MONITORING WELL LOCATION
- EXISTING MIDDLE-INTERVAL MONITORING WELL LOCATION
- RAILROAD TRACKS
- RESULTS OBTAINED FROM MOBILE LABORATORY
- 10 ? PCE CONCENTRATION CONTOUR (DASHED WHERE INFERRED, QUERIED WHERE UNCERTAIN)

SOURCE:

BECHTEL NATIONAL, INC. 1999. FINAL EXTENDED REMOVAL SITE EVALUATION REPORT, INSTALLATION RESTORATION SITES 40 AND 70, NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CALIFORNIA. JUNE.

NOTES:

UPDATED INFORMATION ON THE LATERAL EXTENT OF THE PLUME IS PRESENTED IN THE THIRD ANNUAL GROUNDWATER MONITORING REPORT AND FIGURE 6 OF THIS DESIGN PACKAGE.

ND – DEFINED AS CONCENTRATION BELOW DETECTION LIMIT.

DETECTED CONCENTRATIONS ARE REPORTED IN MICROGRAMS PER LITER (ug/L).

RESULTS ARE ONLY SHOWN FOR MONITORING WELL OR TEMPORARY WELLPOINT LOCATIONS WITH SCREENED INTERVALS FROM THE GREATER THAN 45' DEPTH RANGE.

MOBILE LABORATORY DATA ARE UNVALIDATED.

QUALIFIERS ARE DEFINED AS FOLLOWS:
J – ESTIMATED VALUE

Figure 2-4
HISTORICAL PCE CONCENTRATIONS IN GROUNDWATER GREATER THAN 45 FEET BGS
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 06016924.DWG
DCN: FWSD-RAC-06-0169 CTO: #0090
APPROVED BY: HH
CHECKED BY: HH REV: REVISION 0
DRAWN BY: MD DATE: 11/30/05

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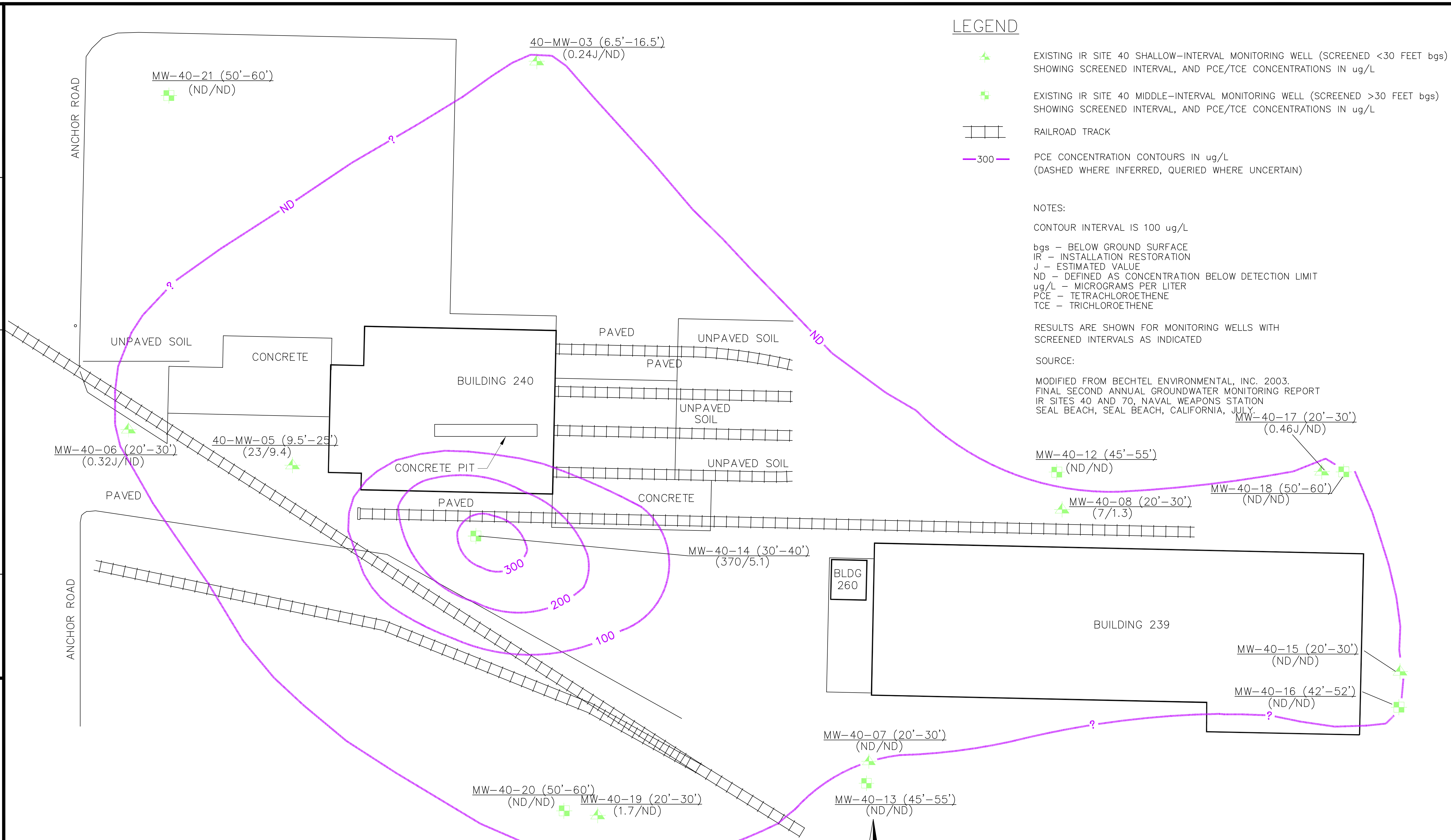

Figure 2-5
PCE AND TCE CONCENTRATIONS IN GROUNDWATER SAMPLES (MARCH 2003)
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 06016925.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: HH
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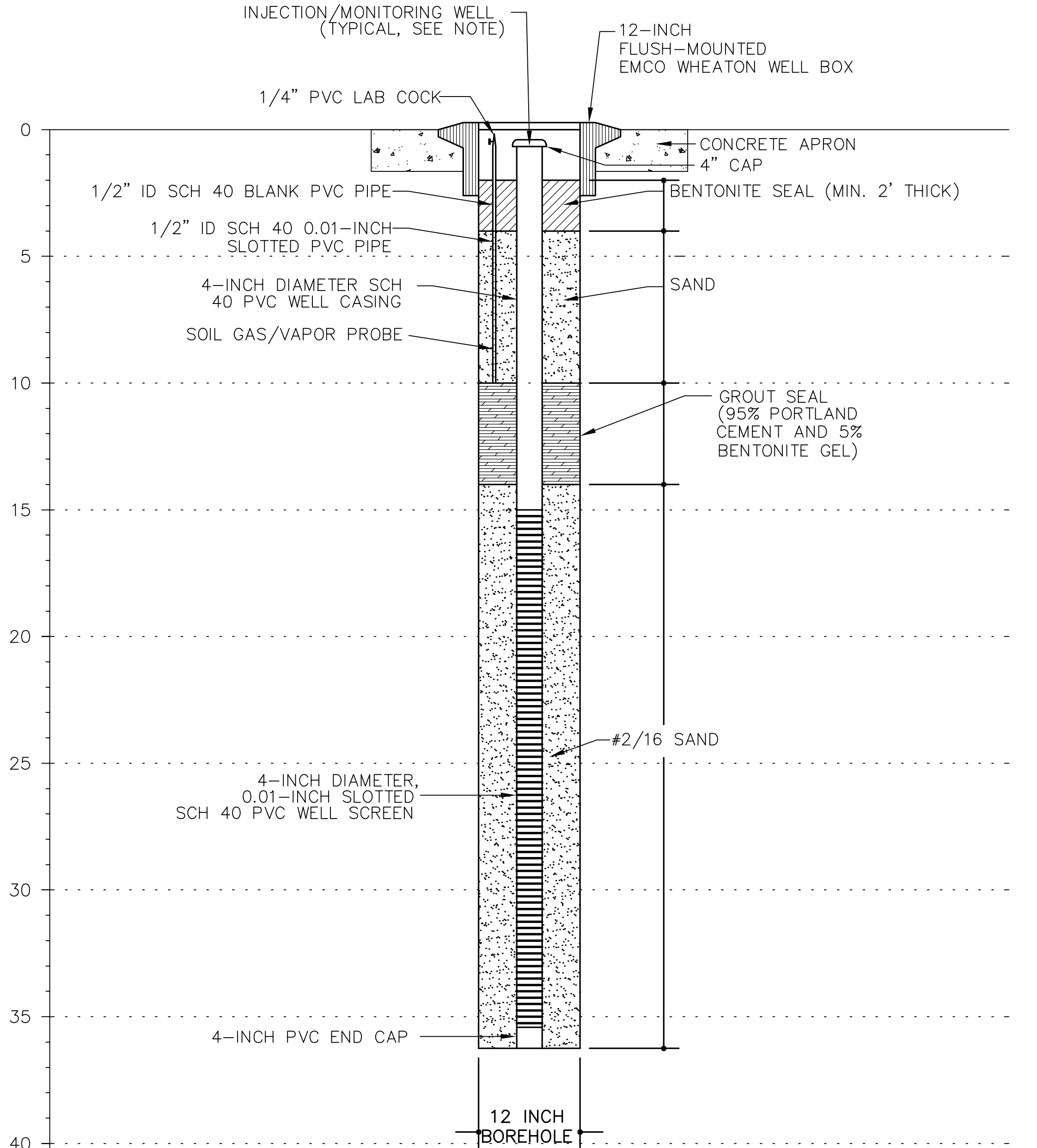

ABBREVIATIONS

ID	INTERNAL DIAMETER
PVC	POLYVINYL CHLORIDE
'	FEET
"	INCHES

NOTES: THIS IS A CONSTRUCTION DETAIL FOR A TYPICAL INJECTION/MONITORING WELL. THE ACTUAL WELL DEPTH AND SCREEN INTERVAL VARY DEPENDING ON LOCATION AND INTENDED USE AND IS SHOWN ON TABLE 3-1.

ALL PIPE CONNECTIONS AND FITTINGS WERE CONSTRUCTED FLUSH THREADED. NO GLUE WAS USED FOR ATTACHING FITTINGS OR PIPE SECTIONS TOGETHER.

ALL MONITORING WELLS MW-40-30 THROUGH -39 AND INJECTION WELLS IW-1 THROUGH IW-17 WITH THE EXCEPTION OF IW-5 ARE CONSTRUCTED WITH A SOIL GAS/VAPOR PROBE. SOIL/VAPOR PROBES ARE NOT INSTALLED IN IW-18 AND IW-19 INJECTION WELLS.

Figure 4-1

INJECTION/MONITORING WELL CONSTRUCTION DETAIL

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 06016941.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: HH
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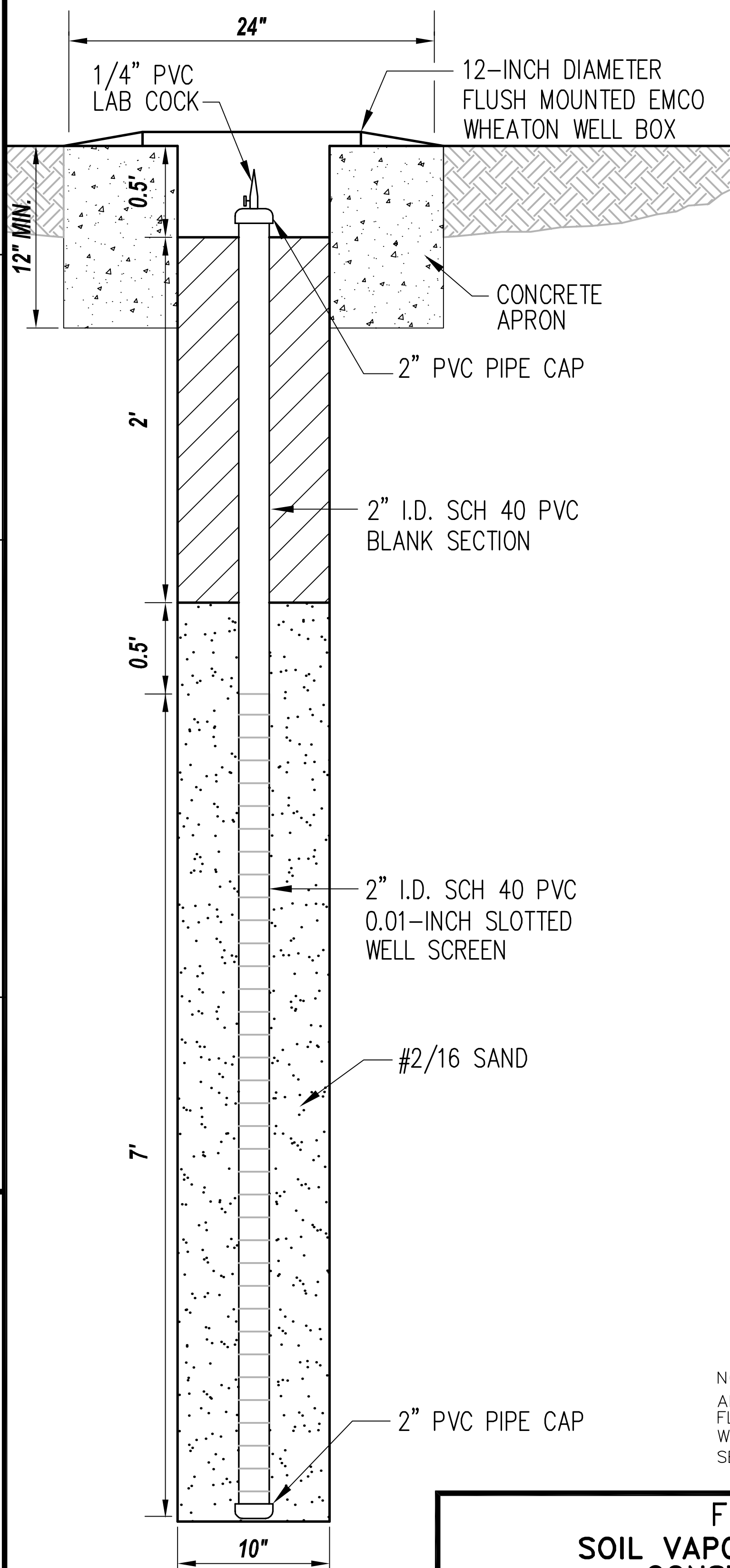

ABBREVIATIONS

I.D.	INTERNAL DIAMETER
PVC	POLYVINYL CHLORIDE
'	FEET
"	INCHES

LEGEND

- #2/16 SAND BACKFILL
- MEDIUM BENTONITE CHIPS

NOTE:
ALL CONNECTIONS WERE CONSTRUCTED WITH FLUSH THREADED PIPES AND FITINGS. NO GLUE WAS USED FOR ATTACHING FITTINGS OR PIPE SECTIONS TOGETHER.

Figure 4-2
SOIL VAPOR MONITORING WELL CONSTRUCTION DETAIL

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 06016942.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: HH
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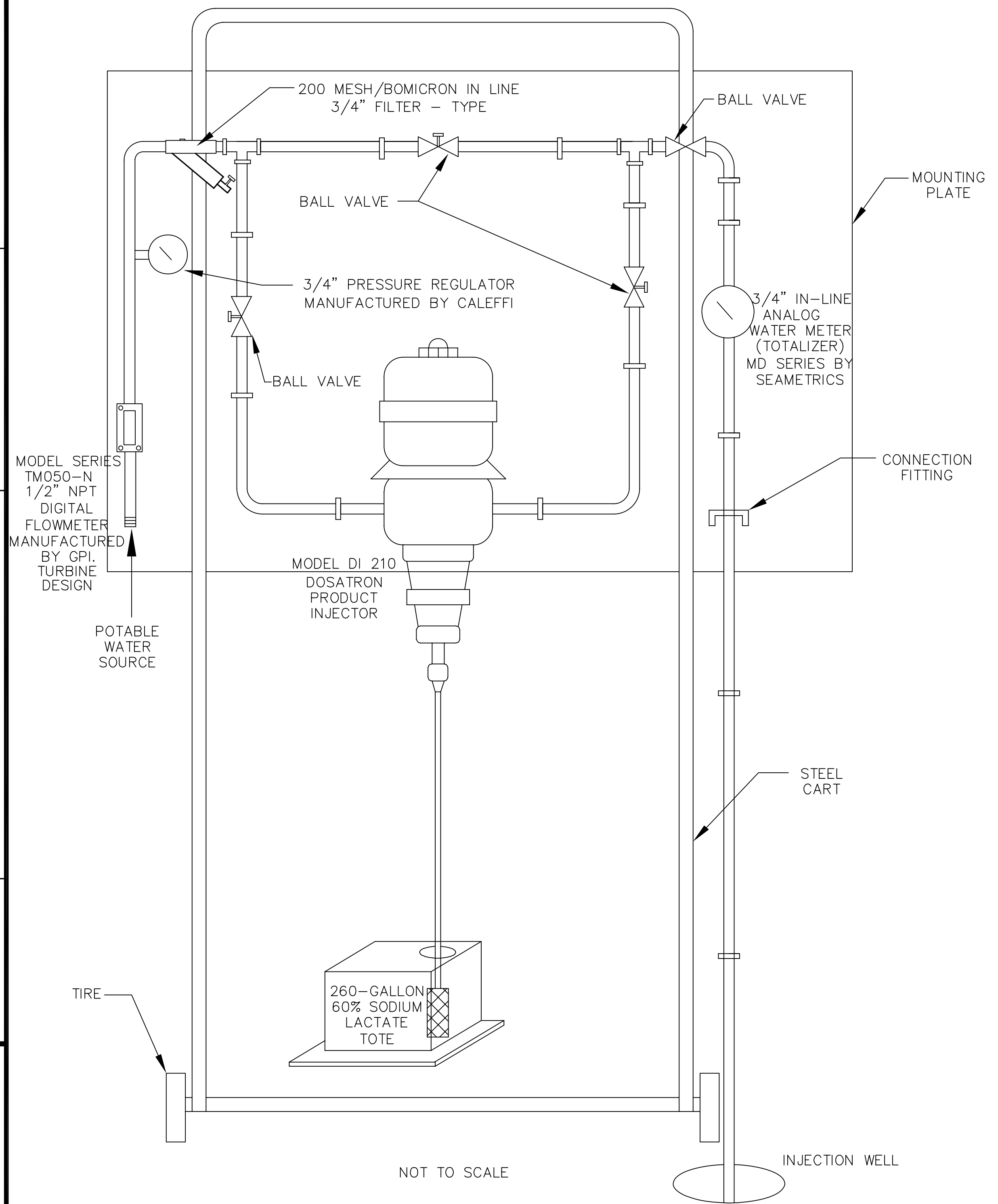

NOTE:
ALL PIPE CONNECTIONS AND FITTINGS WERE FLUSH THREADED. NO GLUE WAS USED FOR ATTACHING FITTINGS OR PIPE SECTIONS TOGETHER.

LEGEND:

- FILTER
- BALL VALVE
- IN-LINE CHECK VALVE
- TIE DOWN STRAP
- IN-LINE FLOW METER

Figure 4-3
REAGENT INJECTOR SYSTEM SCHEMATIC

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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DCN: FWSD-RAC-06-0169	CTO: #0090
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CHECKED BY: HH	REV: REVISION 0
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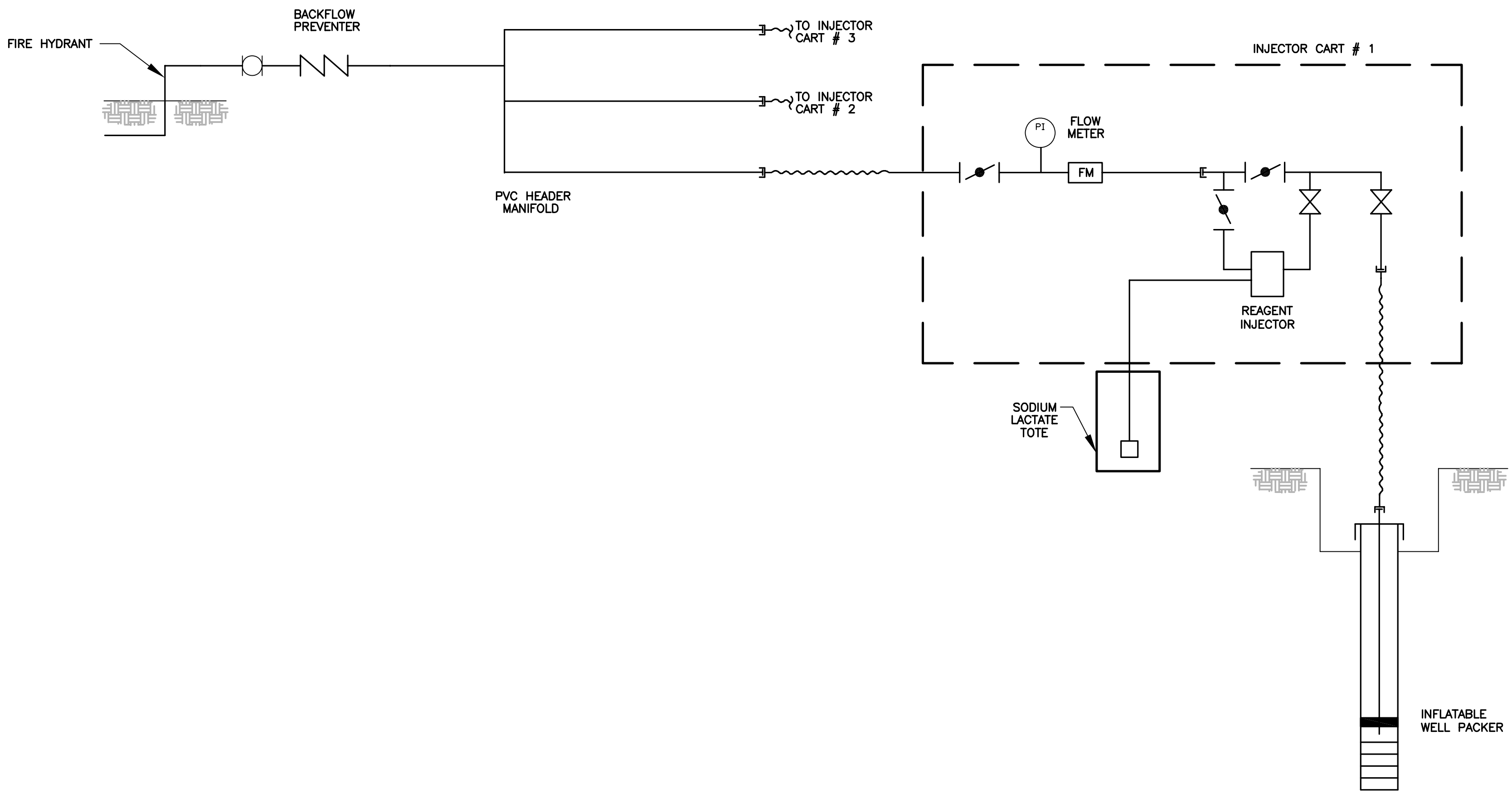
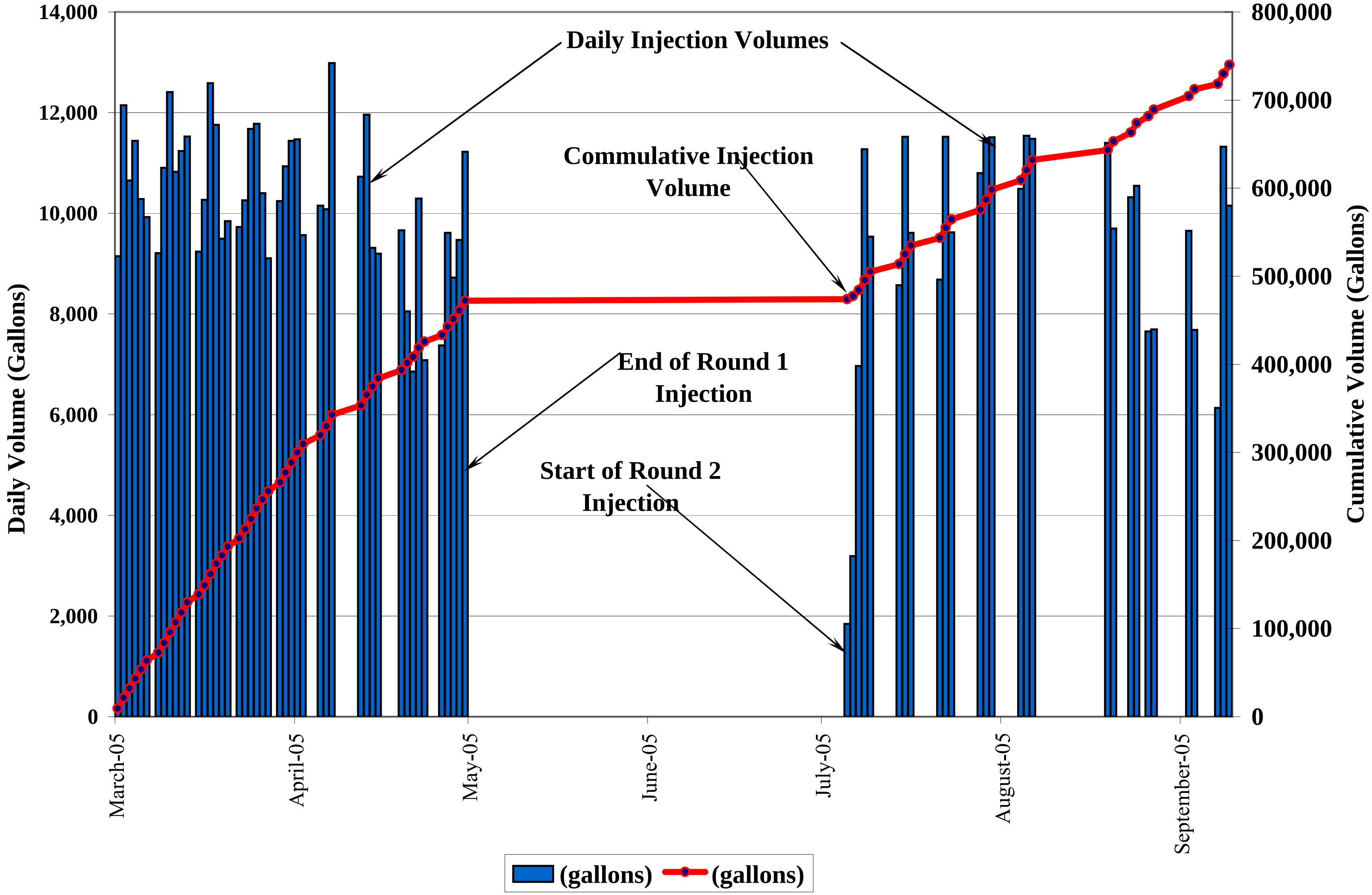


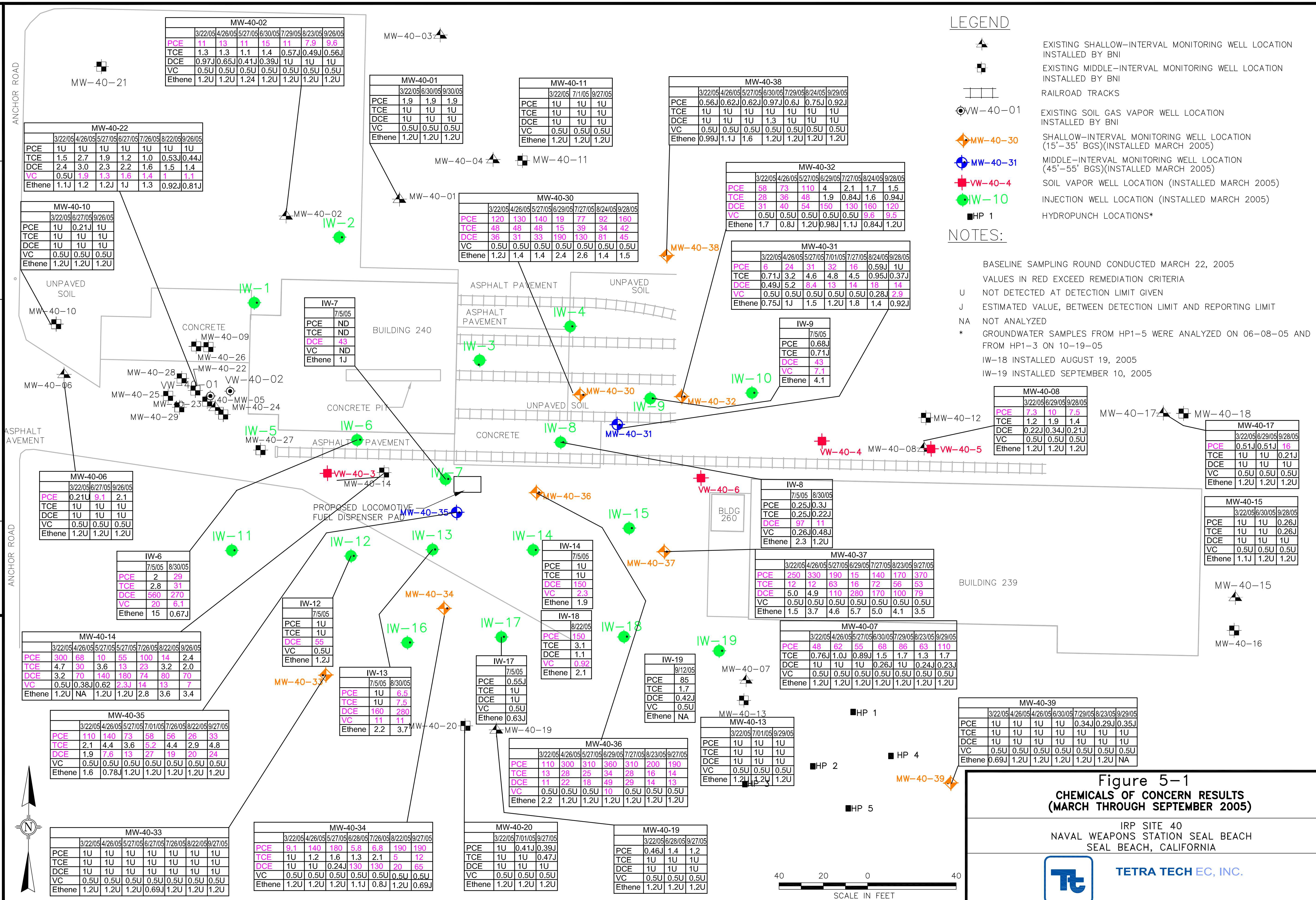
Figure 4-4
INJECTION SYSTEM
PROCESS AND INSTRUMENTATION DIAGRAM

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

Figure 4-5
Daily and Commulative Sodium Lactate Injection Volumes





MW-40-02	3/22/05	4/26/05	5/27/05	6/30/05	7/29/05	8/23/05	9/26/05
PCE	11	13	11	15	11	7.9	9.6
TCE	1.3	1.3	1.1	1.4	0.57J	0.49J	0.56J
DCE	0.97J	0.65J	0.41J	0.39J	1U	1U	1U
VC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.24	1.2U	1.2U	1.2U	1.2U

MW-40-01	3/22/05	6/30/05	9/30/05
PCE	1.9	1.9	1.9
TCE	1U	1U	1U
DCE	1U	1U	1U
VC	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U

MW-40-11	3/22/05	7/1/05	9/27/05
PCE	1U	1U	1U
TCE	1U	1U	1U
DCE	1U	1U	1U
VC	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U

MW-40-38	3/22/05	4/26/05	5/27/05	6/30/05	7/29/05	8/24/05	9/29/05
PCE	0.56J	0.62J	0.62J	0.97J	0.6J	0.75J	0.92J
TCE	1U	1U	1U	1U	1U	1U	1U
DCE	1U	1U	1U	1.3	1U	1U	1U
VC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Ethene	0.99J	1.1J	1.6	1.2U	1.2U	1.2U	1.2U

MW-40-22	3/22/05	4/26/05	5/27/05	6/27/05	7/26/05	8/22/05	9/26/05
PCE	1U	1U	1U	1U	1U	1U	1U
TCE	1.5	2.7	1.9	1.2	1.0	0.53J	0.44J
DCE	2.4	3.0	2.3	2.2	1.6	1.5	1.4
VC	0.5U	1.9	1.3	1.6	1.4	1	1.1
Ethene	1.1J	1.2	1.2J	1J	1.3	0.92J	0.81J

MW-40-10	3/22/05	6/27/05	9/26/05
PCE	1U	0.21J	1U
TCE	1U	1U	1U
DCE	1U	1U	1U
VC	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U

MW-40-32	3/22/05	4/26/05	5/27/05	6/29/05	7/27/05	8/24/05	9/28/05
PCE	58	73	110	4	2.1	1.7	1.5
TCE	28	36	48	1.9	0.84J	1.6	0.94J
DCE	31	40	54	150	130	160	120
VC	0.5U	0.5U	0.5U	0.5U	0.5U	9.6	9.5
Ethene	1.7	0.8J	1.2U	0.98J	1.1J	0.84J	1.2U

MW-40-30	3/22/05	4/26/05	5/27/05	6/29/05	7/27/05	8/24/05	9/28/05
PCE	120	130	140	19	77	92	160
TCE	48	48	48	15	39	34	42
DCE	36	31	33	190	130	81	45
VC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Ethene	1.2J	1.4	1.4	2.4	2.6	1.4	1.5

MW-40-31	3/22/05	4/26/05	5/27/05	7/01/05	7/27/05	8/24/05	9/28/05
PCE	6	24	31	32	16	0.59J	1U
TCE	0.71J	3.2	4.6	4.8	4.5	0.95J	0.37J
DCE	0.49J	5.2	8.4	13	14	18	14
VC	0.5U	0.5U	0.5U	0.5U	0.5U	0.28J	2.9
Ethene	0.75J	1J	1.5	1.2U	1.8	1.4	0.92J

IW-7	7/5/05
PCE	ND
TCE	ND
DCE	43
VC	ND
Ethene	1J

IW-9	7/5/05
PCE	0.68J
TCE	0.71J
DCE	43
VC	7.1
Ethene	4.1

MW-40-08	3/22/05	6/29/05	9/28/05
PCE	7.3	10	7.5
TCE	1.2	1.9	1.4
DCE	0.22J	0.34J	0.21J
VC	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U

MW-40-17	3/22/05	6/29/05	9/28/05
PCE	0.51J	0.51J	16
TCE	1U	1U	0.21J
DCE	1U	1U	1U
VC	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U

MW-40-06	3/22/05	6/27/05	9/26/05
PCE	0.21U	9.1	2.1
TCE	1U	1U	1U
DCE	1U	1U	1U
VC	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U

IW-8	7/5/05	8/30/05
PCE	0.25J	0.3J
TCE	0.25J	0.22J
DCE	97	11
VC	0.26J	0.48J
Ethene	2.3	1.2U

MW-40-15	3/22/05	6/30/05	9/28/05
PCE	1U	1U	0.26J
TCE	1U	1U	0.26J
DCE	1U	1U	1U
VC	0.5U	0.5U	0.5U
Ethene	1.1J	1.2U	1.2U

IW-6	7/5/05	8/30/05
PCE	2	29
TCE	2.8	31
DCE	560	270
VC	20	6.1
Ethene	15	0.67J

IW-14	7/5/05
PCE	1U
TCE	1U
DCE	150
VC	2.3
Ethene	1.9

MW-40-37	3/22/05	4/26/05	5/27/05	6/29/05	7/27/05	8/23/05	9/27/05
PCE	250	330	190	15	140	170	370
TCE	12	12	63	16	72	56	53
DCE	5.0	4.9	110	280	170	100	79
VC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Ethene	1.5	3.7	4.6	5.7	5.0	4.1	3.5

IW-12	7/5/05
PCE	1U
TCE	1U
DCE	55
VC	0.5U
Ethene	1.2J

IW-18	8/22/05
PCE	150
TCE	3.1
DCE	1.1
VC	0.92
Ethene	2.1

MW-40-07	3/22/05	4/26/05	5/27/05	6/30/05	7/29/05	8/23/05	9/29/05
PCE	48	62	55	68	86	63	110
TCE	0.76J	1.0J	0.89J	1.5	1.7	1.3	1.7
DCE	1U	1U	1U	0.26J	1U	0.24J	0.23J
VC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U	1.2U	1.2U	1.2U	1.2U

MW-40-14	3/22/05	4/26/05	5/27/05	5/27/05	7/26/05	8/22/05	9/26/05
PCE	300	68	10	55	100	14	2.4
TCE	4.7	30	3.6	13	23	3.2	2.0
DCE	3.2	70	140	180	74	80	70
VC	0.5U	0.38J	0.62	2.3J	14	13	7
Ethene	1.2U	NA	1.2U	1.2U	2.8	3.6	3.4

IW-17	7/5/05
PCE	0.55J
TCE	1U
DCE	1U
VC	0.5U
Ethene	0.63J

IW-19	9/12/05
PCE	85
TCE	1.7
DCE	0.42J
VC	0.5U
Ethene	NA

IW-13	7/5/05	8/30/05
PCE	1U	6.5
TCE	1U	7.5
DCE	160	280
VC	11	11
Ethene	2.2	3.7

MW-40-39	3/22/05	4/26/05	4/26/05	6/30/05	7/29/05	8/23/05	9/29/05
PCE	1U	1U	1U	1U	0.34J	0.29J	0.35J
TCE	1U	1U	1U	1U	1U	1U	1U
DCE	1U	1U	1U	1U	1U	1U	1U
VC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Ethene	0.69J	1.2U	1.2U	1.2U	1.2U	1.2U	NA

MW-40-35	3/22/05	4/26/05	5/27/05	7/01/05	7/26/05	8/22/05	9/27/05
PCE	110	140	73	58	56	26	33
TCE	2.1	4.4	3.6	5.2	4.4	2.9	4.8
DCE	1.9	7.6	13	27	19	20	24
VC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Ethene	1.6	0.78J	1.2U	1.2U	1.2U	1.2U	1.2U

MW-40-13	3/22/05	7/01/05	9/29/05
PCE	1U	1U	1U
TCE	1U	1U	1U
DCE	1U	1U	1U
VC	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U

MW-40-36	3/22/05	4/26/05	5/27/05	6/29/05	7/27/05	8/23/05	9/27/05
PCE	110	300	310	360	310	200	190
TCE	13	28	25	34	28	16	14
DCE	11	22	18	49	29	14	13
VC	0.5U	0.5U	0.5U	10	0.5U	0.5U	0.5U
Ethene	2.2	1.2U	1.2U	1.2U	1.2U	1.2U	1.2U

MW-40-33	3/22/05	4/26/05	5/27/05	6/27/05	7/26/05	8/22/05	9/27/05
PCE	1U	1U	1U	1U	1U	1U	1U
TCE	1U	1U	1U	1U	1U	1U	1U
DCE	1U	1U	1U	1U	1U	1U	1U
VC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U	0.69J	1.2U	1.2U	1.2U

MW-40-34	3/22/05	4/26/05	5/27/05	6/28/05	7/26/05	8/22/05	9/27/05
PCE	9.1	140	180	5.8	6.8	190	190
TCE	1U	1.2	1.6	1.3	2.1	5	12
DCE	1U	1U	0.24J	130	130	20	65
VC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U	1.1J	0.8J	1.2U	0.69J

MW-40-20	3/22/05	7/01/05	9/27/05
PCE	1U	0.41J	0.39J
TCE	1U	1U	0.47J
DCE	1U	1U	1U
VC	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U

MW-40-19	3/22/05	6/28/05	9/27/05
PCE	0.46J	1.4	1.2
TCE	1U	1U	1U
DCE	1U	1U	1U
VC	0.5U	0.5U	0.5U
Ethene	1.2U	1.2U	1.2U

LEGEND

EXISTING SHALLOW-INTERVAL MONITORING WELL LOCATION INSTALLED BY BNI

EXISTING MIDDLE-INTERVAL MONITORING WELL LOCATION INSTALLED BY BNI

RAILROAD TRACKS

VW-40-01 EXISTING SOIL GAS VAPOR WELL LOCATION INSTALLED BY BNI

MW-40-30 SHALLOW-INTERVAL MONITORING WELL LOCATION (15'-35' BGS)(INSTALLED MARCH 2005)

MW-40-31 MIDDLE-INTERVAL MONITORING WELL LOCATION (45'-55' BGS)(INSTALLED MARCH 2005)

VW-40-4 SOIL VAPOR WELL LOCATION (INSTALLED MARCH 2005)

IW-10 INJECTION WELL LOCATION (INSTALLED MARCH 2005)

HP 1 HYDROPUNCH LOCATIONS*

NOTES:

BASELINE SAMPLING ROUND CONDUCTED MARCH 22, 2005

VALUES IN RED EXCEED REMEDIATION CRITERIA

U NOT DETECTED AT DETECTION LIMIT GIVEN

J ESTIMATED VALUE, BETWEEN DETECTION LIMIT AND REPORTING LIMIT

NA NOT ANALYZED

* GROUNDWATER SAMPLES FROM HP1-5 WERE ANALYZED ON 06-08-05 AND FROM HP1-3 ON 10-19-05

IW-18 INSTALLED AUGUST 19, 2005

IW-19 INSTALLED SEPTEMBER 10, 2005

Figure 5-1
CHEMICALS OF CONCERN RESULTS (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 06016951.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: HH
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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DRAWING NO: 06016952.DWG

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APPROVED BY: HH

CHECKED BY: HH REV: REVISION 0

DRAWN BY: MD DATE: 11/30/05

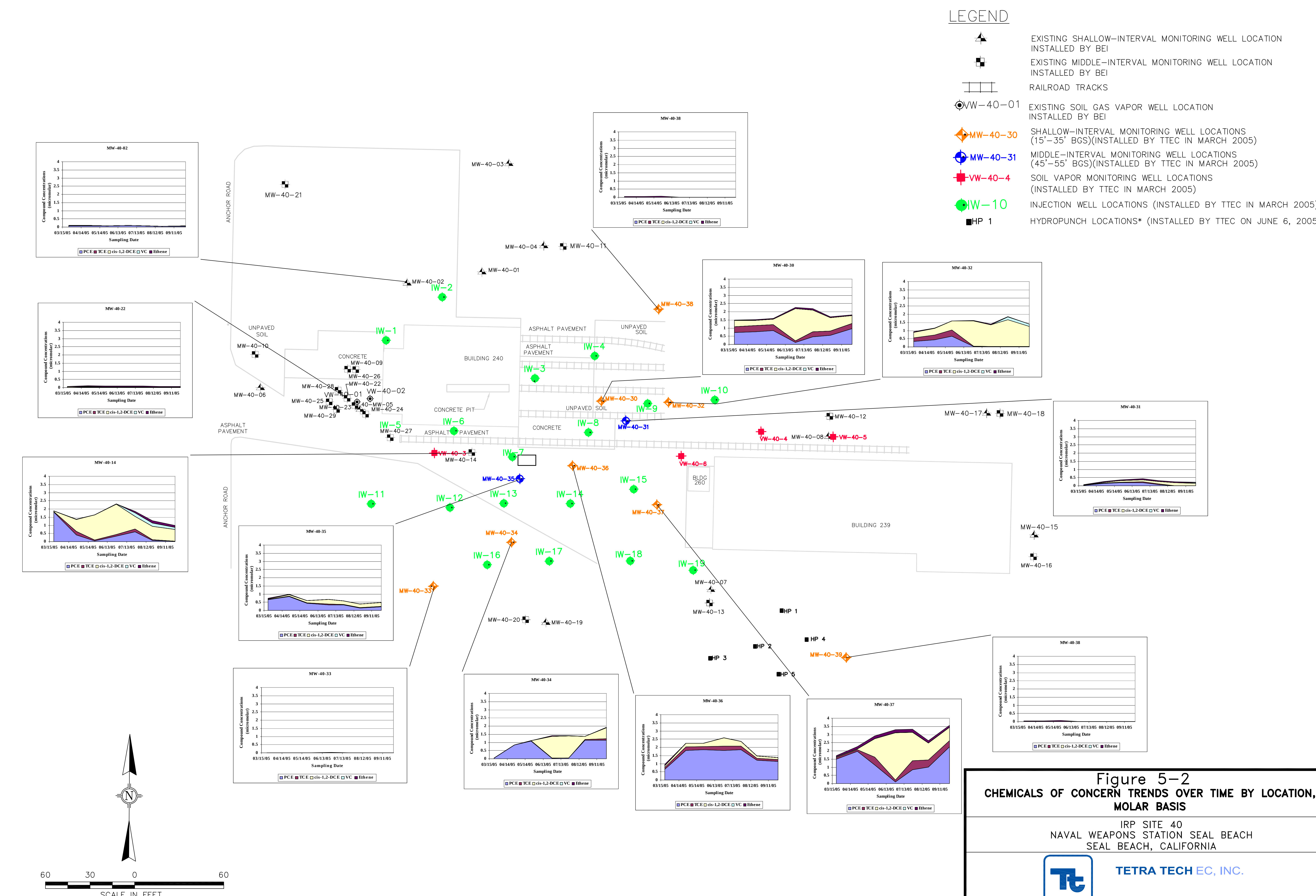

Figure 5-2
CHEMICALS OF CONCERN TRENDS OVER TIME BY LOCATION, MOLAR BASIS

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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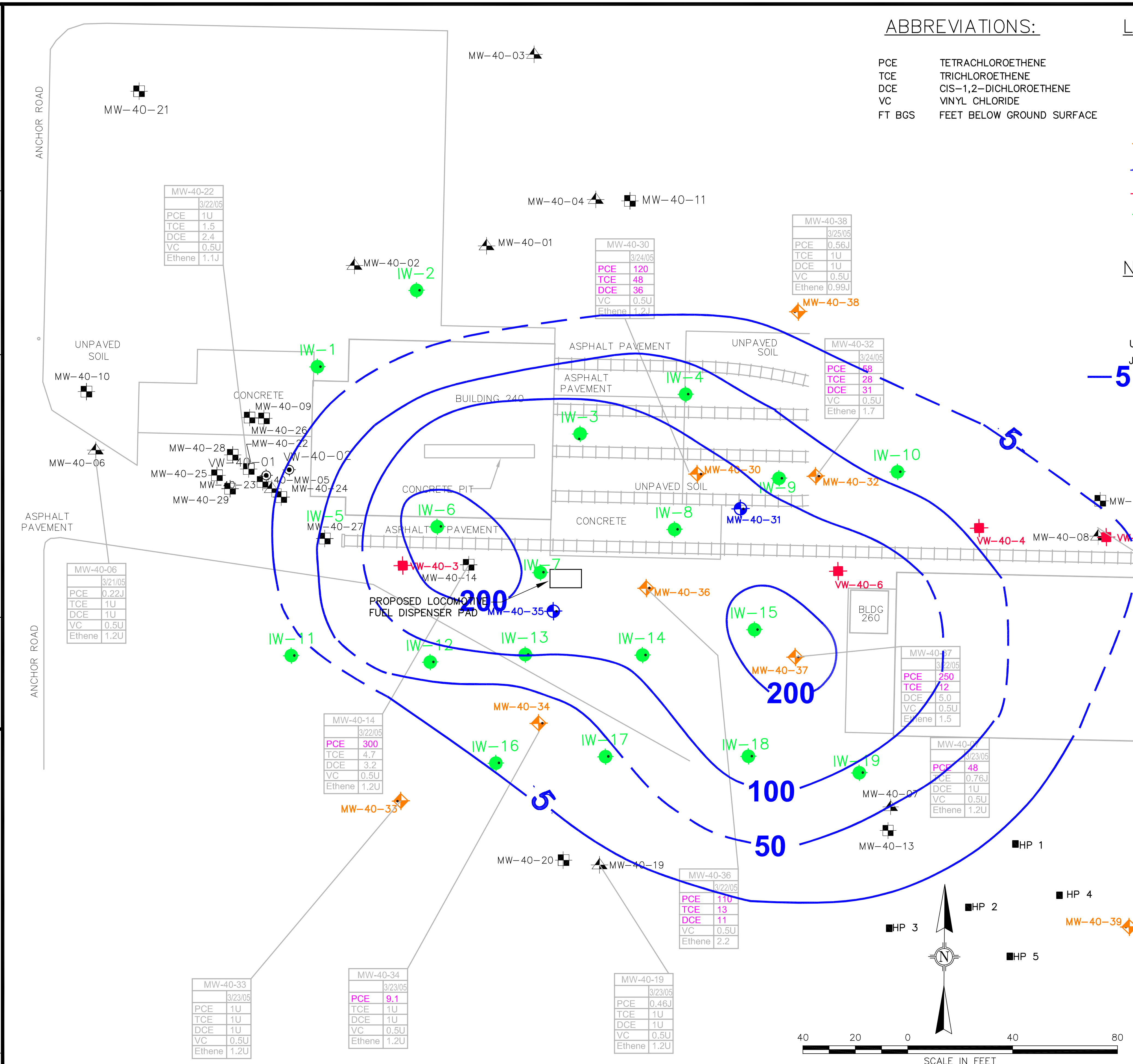

ABBREVIATIONS:

PCE	TETRACHLOROETHENE
TCE	TRICHLOROETHENE
DCE	CIS–1,2–DICHLOROETHENE
VC	VINYL CHLORIDE
FT BGS	FEET BELOW GROUND SURFACE

LEGEND

	EXISTING SHALLOW–INTERVAL MONITORING WELL LOCATION
	EXISTING MIDDLE–INTERVAL MONITORING WELL LOCATION
	RAILROAD TRACKS
VW–40–01	EXISTING SOIL GAS VAPOR WELL LOCATION
MW–40–30	SHALLOW–INTERVAL MONITORING WELL LOCATION (15'–35' BGS)(INSTALLED MARCH 2005)
MW–40–31	MIDDLE–INTERVAL MONITORING WELL LOCATION (45'–55' BGS)(INSTALLED MARCH 2005)
VW–40–4	SOIL VAPOR WELL LOCATION (INSTALLED MARCH 2005)
IW–10	INJECTION WELL LOCATION (INSTALLED MARCH 2005)
HP 1	HYDROPUNCH LOCATIONS

NOTES:

ALL CONCENTRATIONS IN MICROGRAMS PER LITER (μg/L)
VALUES FOR PCE PRESENTED
VALUES IN RED EXCEED REMEDIATION CRITERIA

U NOT DETECTED AT REPORTING LIMIT GIVEN
J ESTIMATED VALUE
5 INTERPRETED PCE CONCENTRATION CONTOUR (μg/L)(DASHED WHERE INFERRED)

ALTHOUGH WELLS MW–40–14 AND MW–40–22 ARE DESIGNATED AS MIDDLE–INTERVAL MONITORING WELLS, THEY WERE INCLUDED AS A PART OF THE SHALLOW WELL CONCENTRATION CONTOUR INTERPRETATION CONSIDERING THEIR SCREEN INTERVAL (30–40 FT BGS, AND 15.3–35.5 FT BGS, RESPECTIVELY)

Figure 5–3

PCE CONCENTRATION CONTOURS, SHALLOW–INTERVAL MONITORING WELLS, MARCH 2005 (BASELINE EVENT)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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DCN: FWSD–RAC–06–0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: HH
REV: REVISION 0
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DATE: 10/19/05

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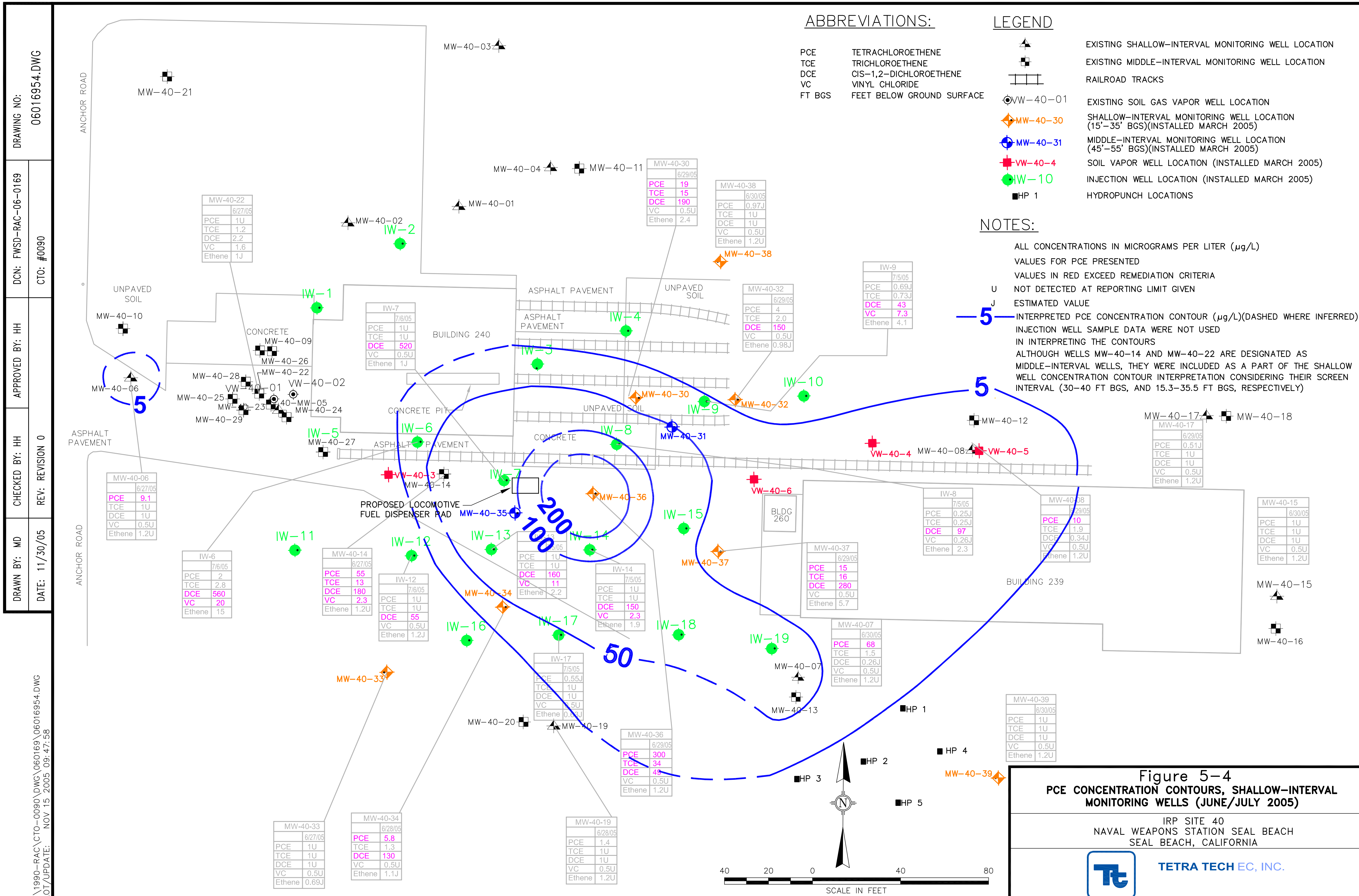


Figure 5-4
PCE CONCENTRATION CONTOURS, SHALLOW-INTERVAL MONITORING WELLS (JUNE/JULY 2005)
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

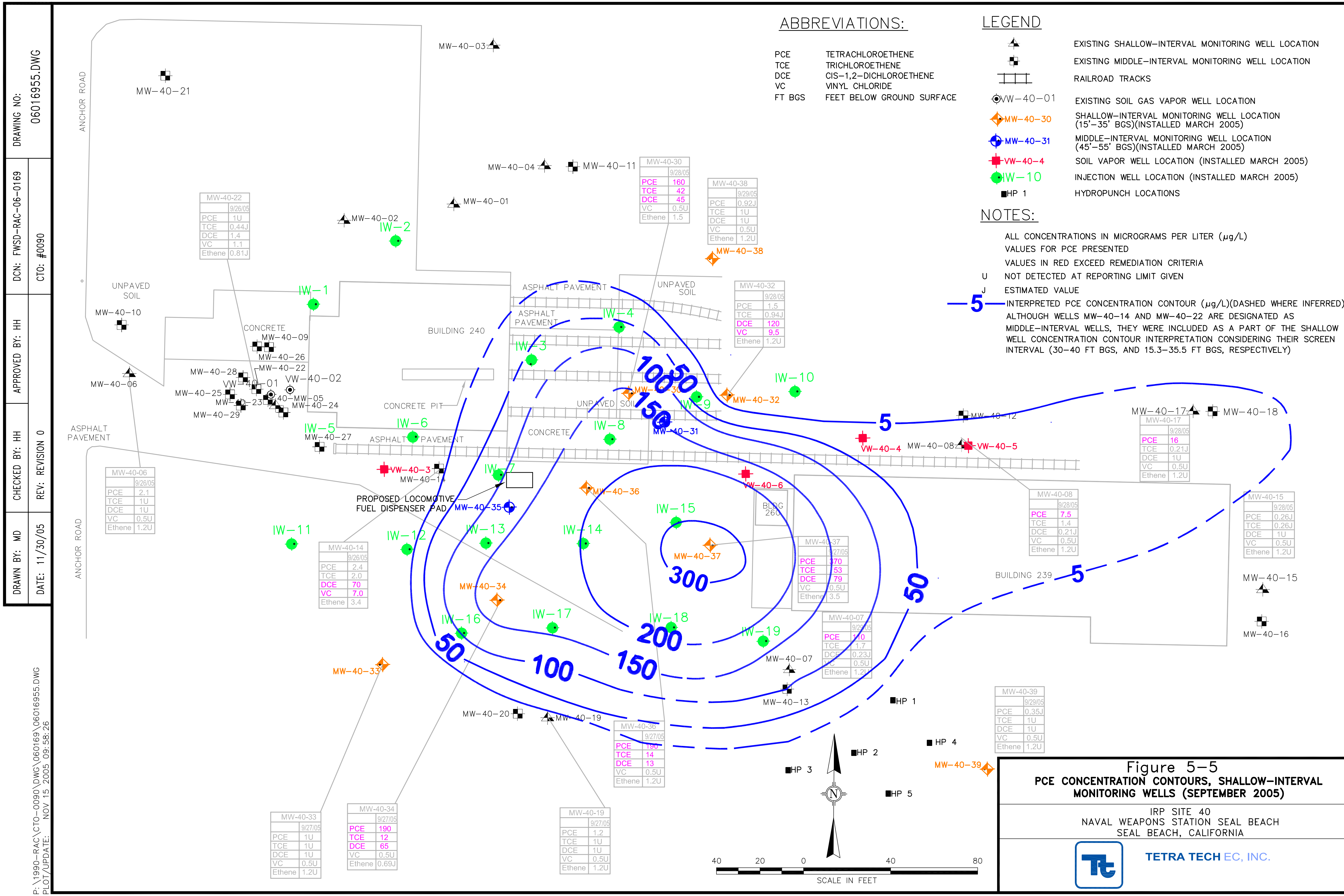


Figure 5-5
PCE CONCENTRATION CONTOURS, SHALLOW-INTERVAL MONITORING WELLS (SEPTEMBER 2005)
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

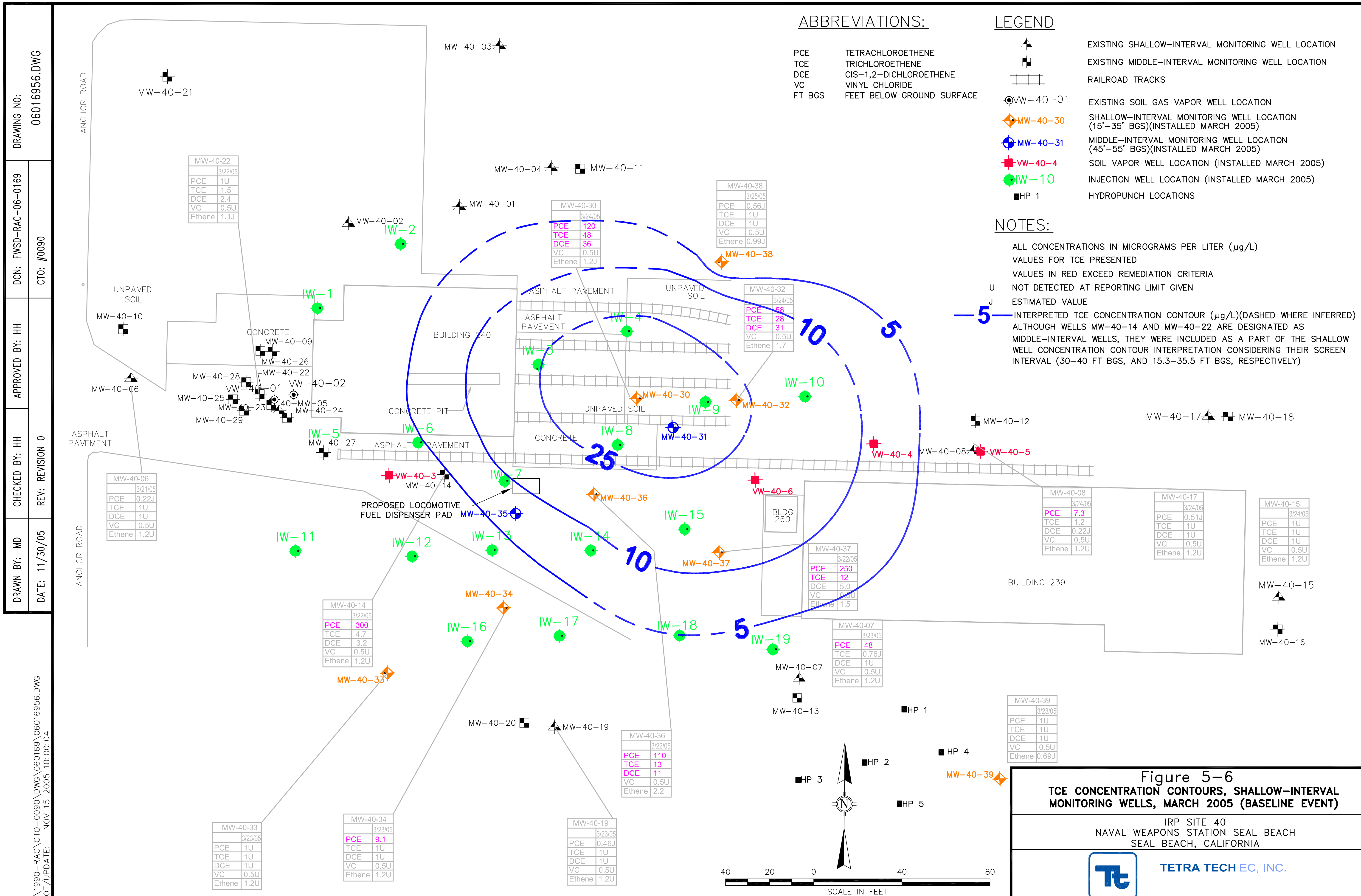


Figure 5-6
TCE CONCENTRATION CONTOURS, SHALLOW-INTERVAL MONITORING WELLS, MARCH 2005 (BASELINE EVENT)
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

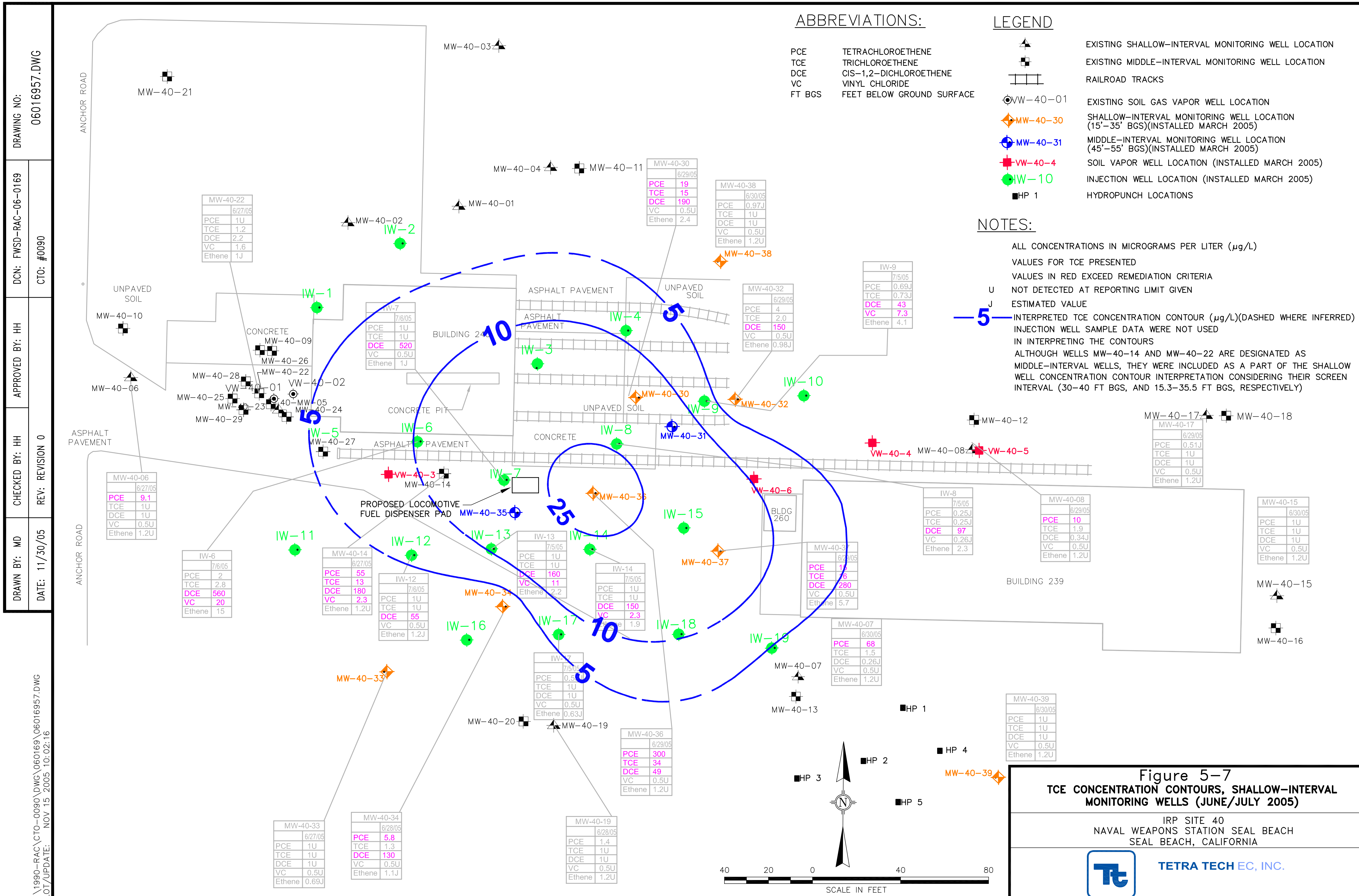
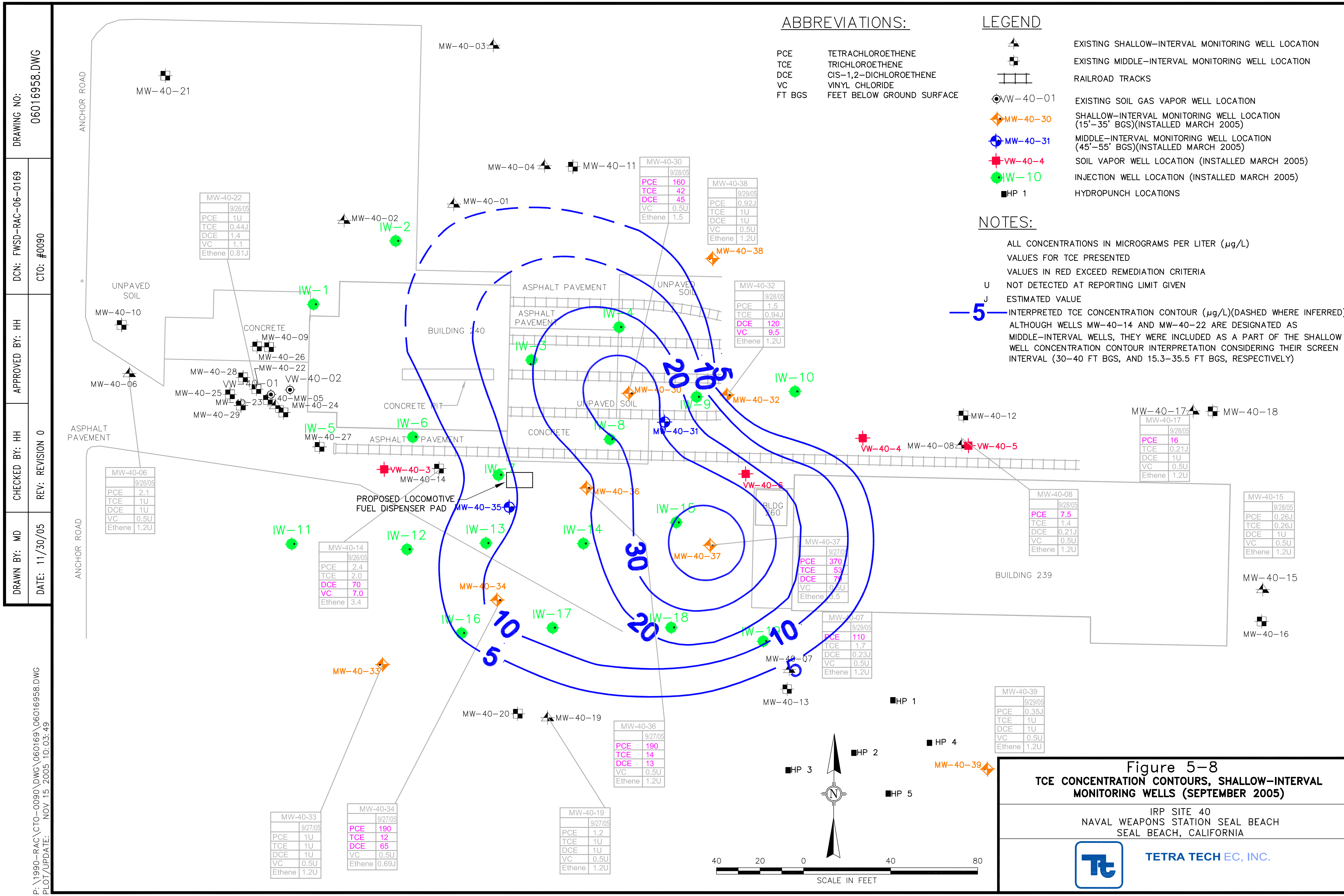


Figure 5-7
TCE CONCENTRATION CONTOURS, SHALLOW-INTERVAL MONITORING WELLS (JUNE/JULY 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA



ABBREVIATIONS:
PCE TETRACHLOROETHENE
TCE TRICHLOROETHENE
DCE CIS-1,2-DICHLOROETHENE
VC VINYL CHLORIDE
FT BGS FEET BELOW GROUND SURFACE
LEGEND
EXISTING SHALLOW-INTERVAL MONITORING WELL LOCATION
EXISTING MIDDLE-INTERVAL MONITORING WELL LOCATION
RAILROAD TRACKS
VW-40-01 EXISTING SOIL GAS VAPOR WELL LOCATION
MW-40-30 SHALLOW-INTERVAL MONITORING WELL LOCATION (15'-35' BGS)(INSTALLED MARCH 2005)
MW-40-31 MIDDLE-INTERVAL MONITORING WELL LOCATION (45'-55' BGS)(INSTALLED MARCH 2005)
VW-40-4 SOIL VAPOR WELL LOCATION (INSTALLED MARCH 2005)
IW-10 INJECTION WELL LOCATION (INSTALLED MARCH 2005)
HP 1 HYDROPUNCH LOCATIONS
NOTES:
ALL CONCENTRATIONS IN MICROGRAMS PER LITER (μg/L)
VALUES FOR TCE PRESENTED
VALUES IN RED EXCEED REMEDIATION CRITERIA
U NOT DETECTED AT REPORTING LIMIT GIVEN
J ESTIMATED VALUE
5 INTERPRETED TCE CONCENTRATION CONTOUR (μg/L)(DASHED WHERE INFERRED)
ALTHOUGH WELLS MW-40-14 AND MW-40-22 ARE DESIGNATED AS MIDDLE-INTERVAL WELLS, THEY WERE INCLUDED AS A PART OF THE SHALLOW WELL CONCENTRATION CONTOUR INTERPRETATION CONSIDERING THEIR SCREEN INTERVAL (30-40 FT BGS, AND 15.3-35.5 FT BGS, RESPECTIVELY)
MW-40-22 9/26/05 PCE 1U TCE 0.44J DCE 1.4 VC 1.1 Ethene 0.81J
MW-40-30 9/28/05 PCE 160 TCE 42 DCE 45 VC 0.5U Ethene 1.5
MW-40-38 9/29/05 PCE 0.92J TCE 1U DCE 1U VC 0.5U Ethene 1.2U
MW-40-32 9/28/05 PCE 1.5 TCE 0.94J DCE 120 VC 9.5 Ethene 1.2U
MW-40-17 9/28/05 PCE 16 TCE 0.21J DCE 1U VC 0.5U Ethene 1.2U
MW-40-06 9/26/05 PCE 2.1 TCE 1U DCE 1U VC 0.5U Ethene 1.2U
MW-40-14 9/26/05 PCE 2.4 TCE 2.0 DCE 70 VC 7.0 Ethene 3.4
MW-40-08 9/28/05 PCE 7.5 TCE 1.4 DCE 0.21J VC 0.5U Ethene 1.2U
MW-40-15 9/28/05 PCE 0.26J TCE 0.26J DCE 1U VC 0.5U Ethene 1.2U
MW-40-37 9/27/05 PCE 370 TCE 53 DCE 78 VC 0.5U Ethene 3.5
MW-40-07 9/29/05 PCE 110 TCE 1.7 DCE 0.23J VC 0.5U Ethene 1.2U
MW-40-39 9/29/05 PCE 0.35J TCE 1U DCE 1U VC 0.5U Ethene 1.2U
MW-40-36 9/27/05 PCE 190 TCE 14 DCE 13 VC 0.5U Ethene 1.2U
MW-40-33 9/27/05 PCE 1U TCE 1U DCE 1U VC 0.5U Ethene 1.2U
MW-40-34 9/27/05 PCE 190 TCE 12 DCE 65 VC 0.5U Ethene 0.69J
MW-40-19 9/27/05 PCE 1.2 TCE 1U DCE 1U VC 0.5U Ethene 1.2U
ANCHOR ROAD
UNPAVED SOIL
ASPHALT PAVEMENT
CONCRETE
BUILDING 240
CONCRETE PIT
PROPOSED LOCOMOTIVE FUEL DISPENSER PAD
BLDG 260
BUILDING 239
SCALE IN FEET
40 20 0 40 80
Figure 5-8
TCE CONCENTRATION CONTOURS, SHALLOW-INTERVAL MONITORING WELLS (SEPTEMBER 2005)
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA
TETRA TECH EC, INC.
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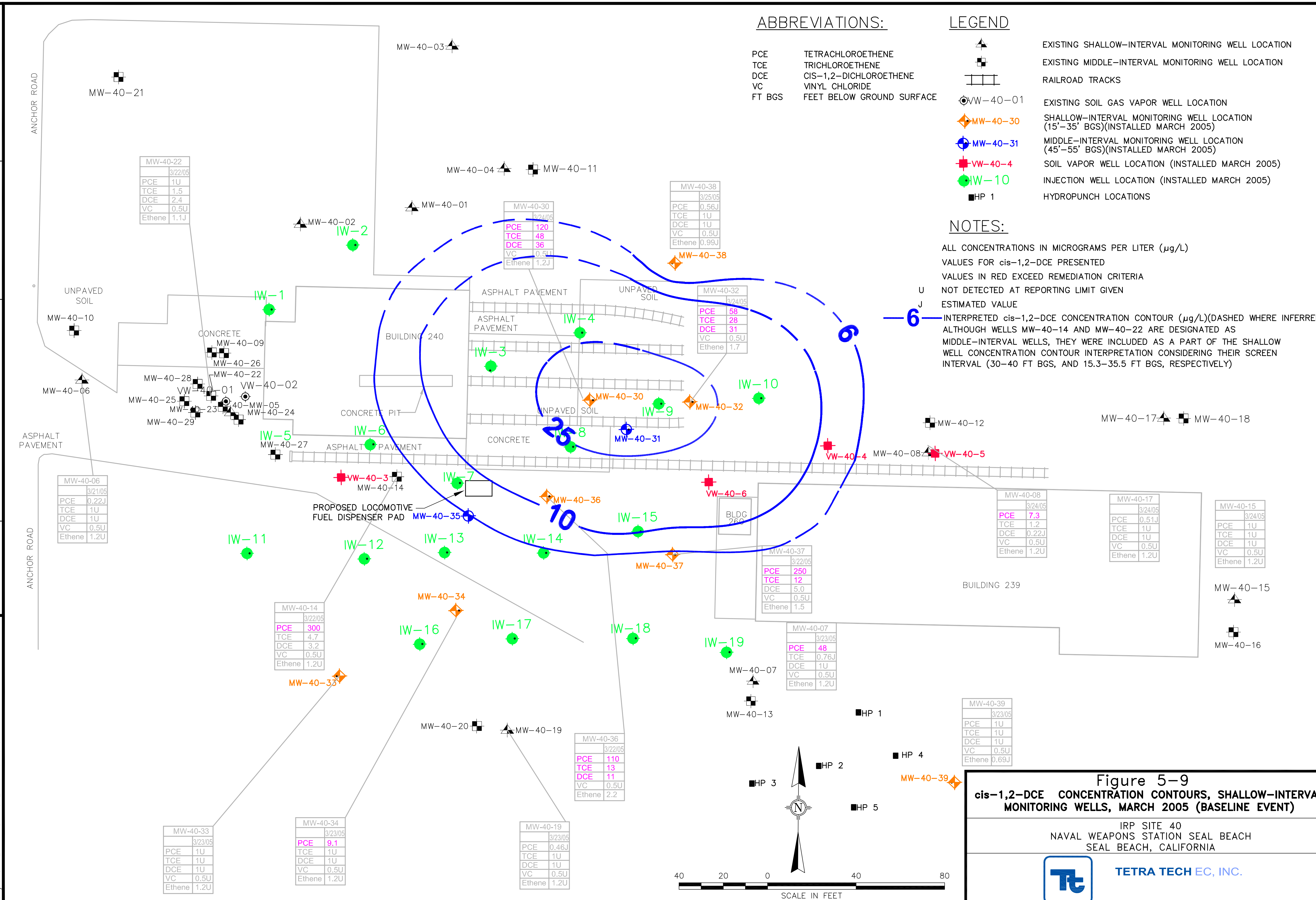

Figure 5–9
cis–1,2–DCE CONCENTRATION CONTOURS, SHALLOW–INTERVAL MONITORING WELLS, MARCH 2005 (BASELINE EVENT)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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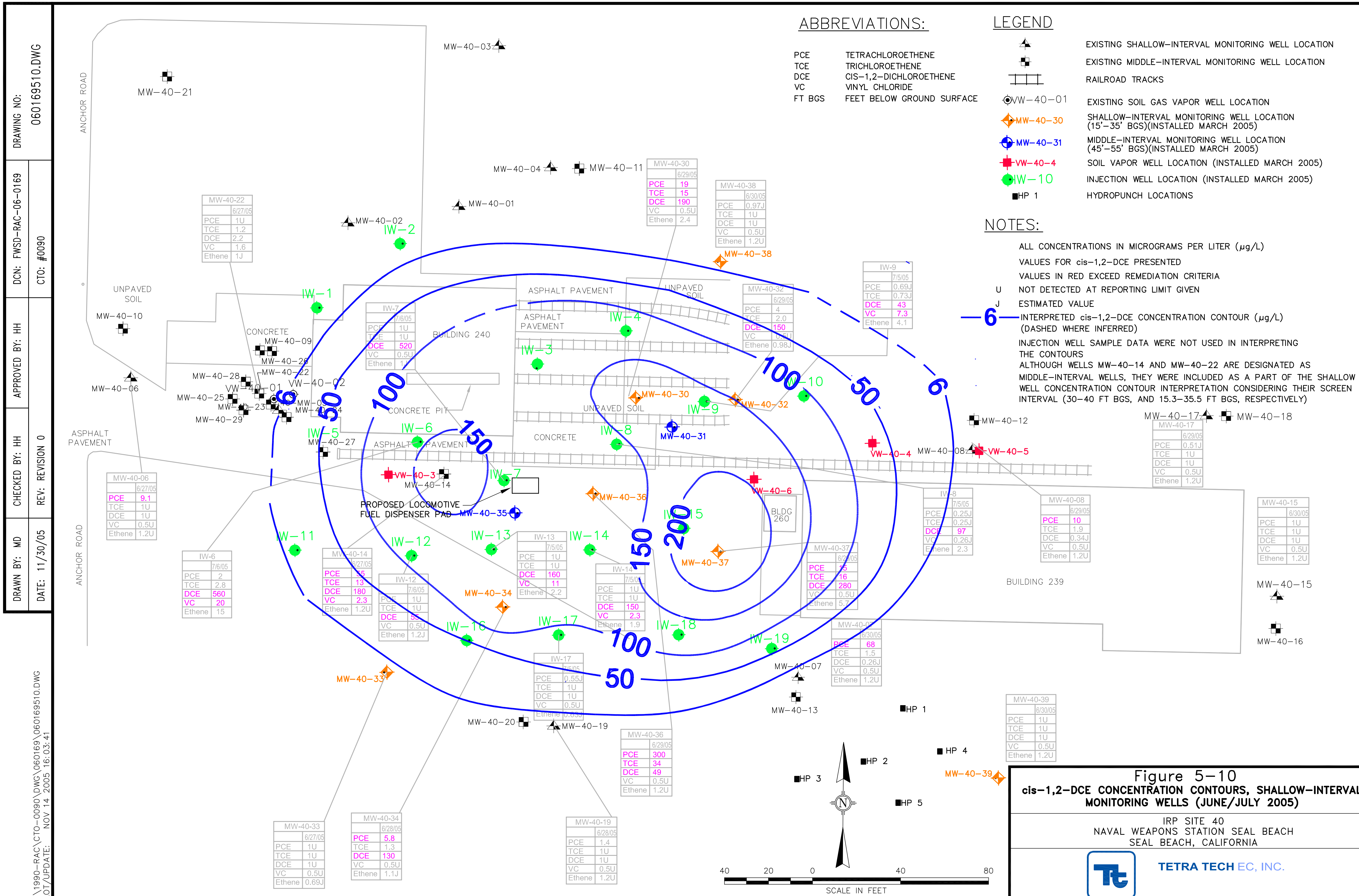

Figure 5-10
cis-1,2-DCE CONCENTRATION CONTOURS, SHALLOW-INTERVAL MONITORING WELLS (JUNE/JULY 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

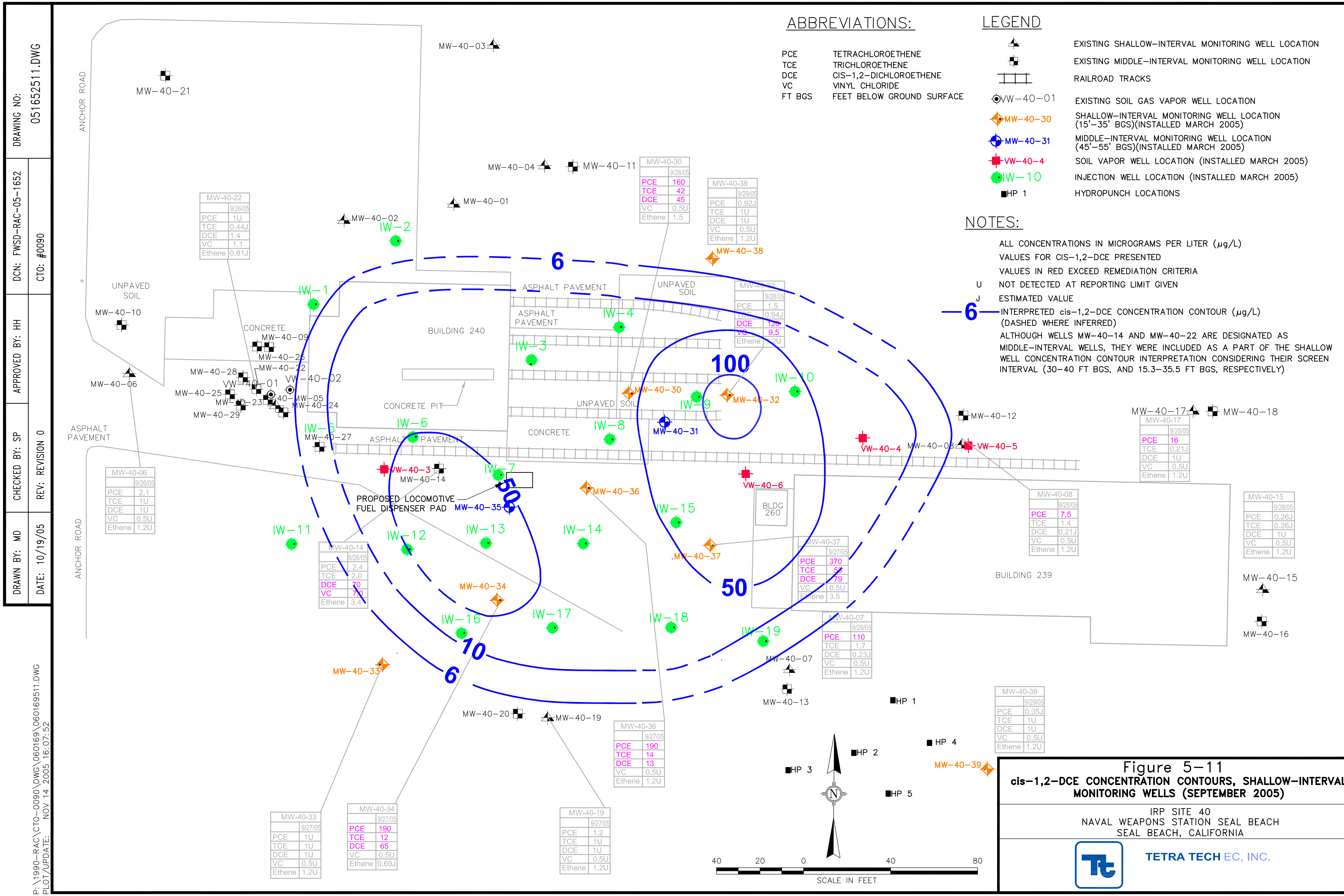

Figure 5-11
cis-1,2-DCE CONCENTRATION CONTOURS, SHALLOW-INTERVAL MONITORING WELLS (SEPTEMBER 2005)
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

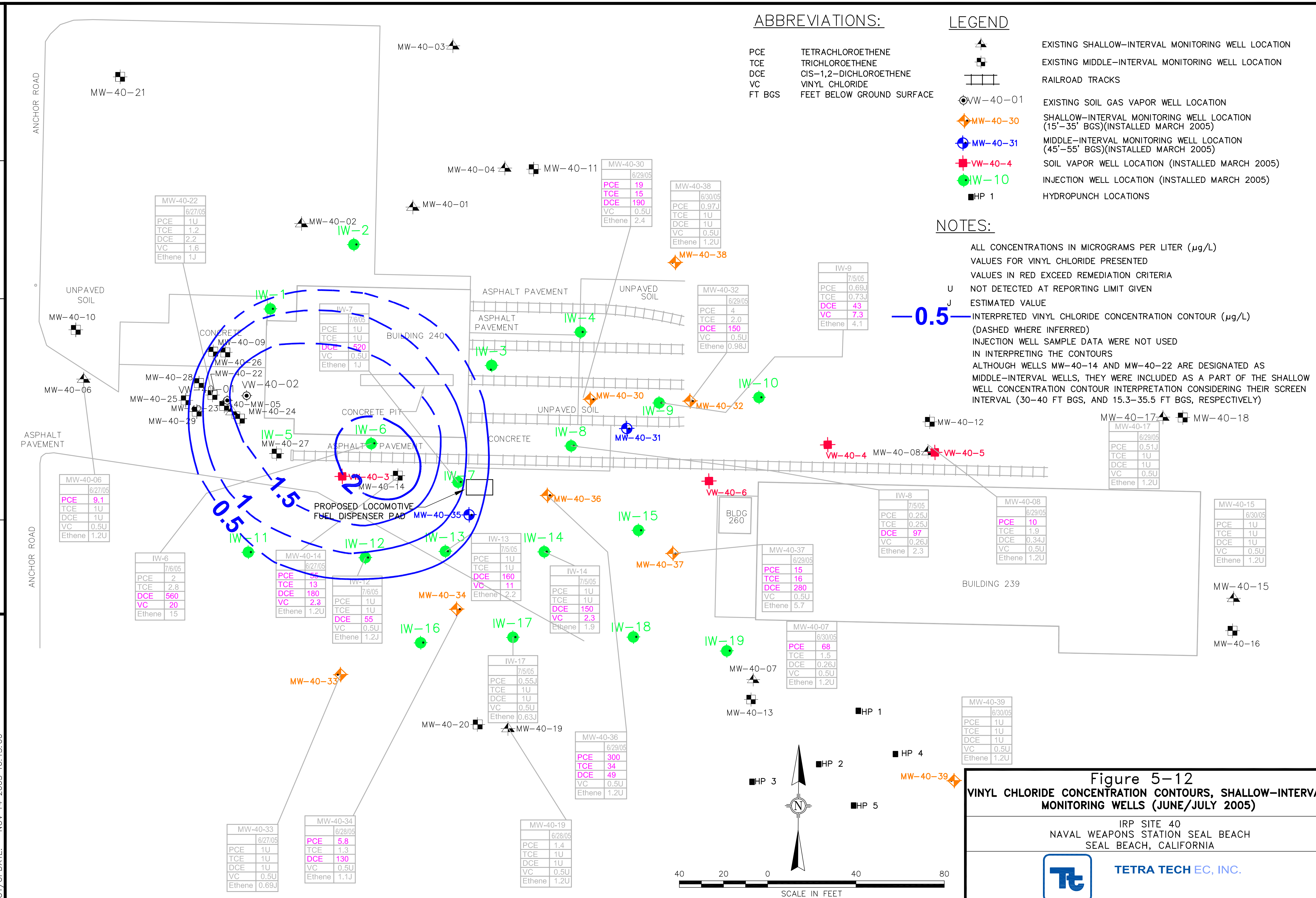

Figure 5–12
VINYL CHLORIDE CONCENTRATION CONTOURS, SHALLOW–INTERVAL MONITORING WELLS (JUNE/JULY 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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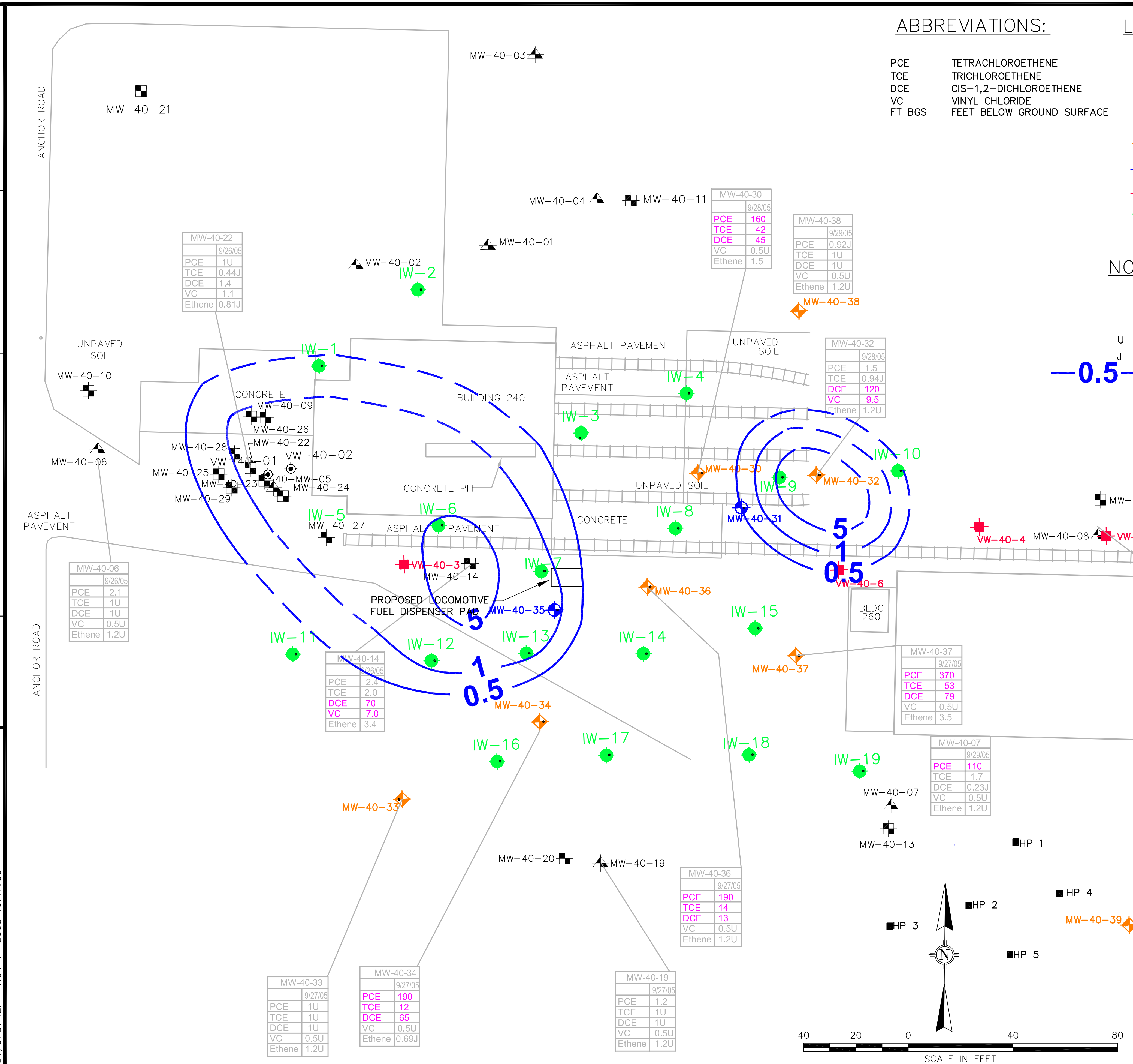

ABBREVIATIONS:

PCE	TETRACHLOROETHENE
TCE	TRICHLOROETHENE
DCE	CIS-1,2-DICHLOROETHENE
VC	VINYL CHLORIDE
FT BGS	FEET BELOW GROUND SURFACE

LEGEND

	EXISTING SHALLOW-INTERVAL MONITORING WELL LOCATION
	EXISTING MIDDLE-INTERVAL MONITORING WELL LOCATION
	RAILROAD TRACKS
VW-40-01	EXISTING SOIL GAS VAPOR WELL LOCATION
MW-40-30	SHALLOW-INTERVAL MONITORING WELL LOCATION (15'-35' BGS)(INSTALLED MARCH 2005)
MW-40-31	MIDDLE-INTERVAL MONITORING WELL LOCATION (45'-55' BGS)(INSTALLED MARCH 2005)
VW-40-4	SOIL VAPOR WELL LOCATION (INSTALLED MARCH 2005)
IW-10	INJECTION WELL LOCATION (INSTALLED MARCH 2005)
HP 1	HYDROPUNCH LOCATIONS

NOTES:

ALL CONCENTRATIONS IN MICROGRAMS PER LITER (μg/L)
VALUES FOR VC PRESENTED
VALUES IN RED EXCEED REMEDIATION CRITERIA
U NOT DETECTED AT REPORTING LIMIT GIVEN
J ESTIMATED VALUE
0.5 INTERPRETED VINYL CHLORIDE CONCENTRATION CONTOUR (μg/L) (DASHED WHERE INFERRED)
ALTHOUGH WELLS MW-40-14 AND MW-40-22 ARE DESIGNATED AS MIDDLE-INTERVAL WELLS, THEY WERE INCLUDED AS A PART OF THE SHALLOW WELL CONCENTRATION CONTOUR INTERPRETATION CONSIDERING THEIR SCREEN INTERVAL (30-40 FT BGS, AND 15.3-35.5 FT BGS, RESPECTIVELY)

Figure 5-13

VINYL CHLORIDE CONCENTRATION CONTOURS, SHALLOW-INTERVAL MONITORING WELLS (SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169513.DWG
DCN: FWSD-RAC-06-0169 CTO: #0090
APPROVED BY: HH
CHECKED BY: HH REV: REVISION 0
DRAWN BY: MD DATE: 11/30/05

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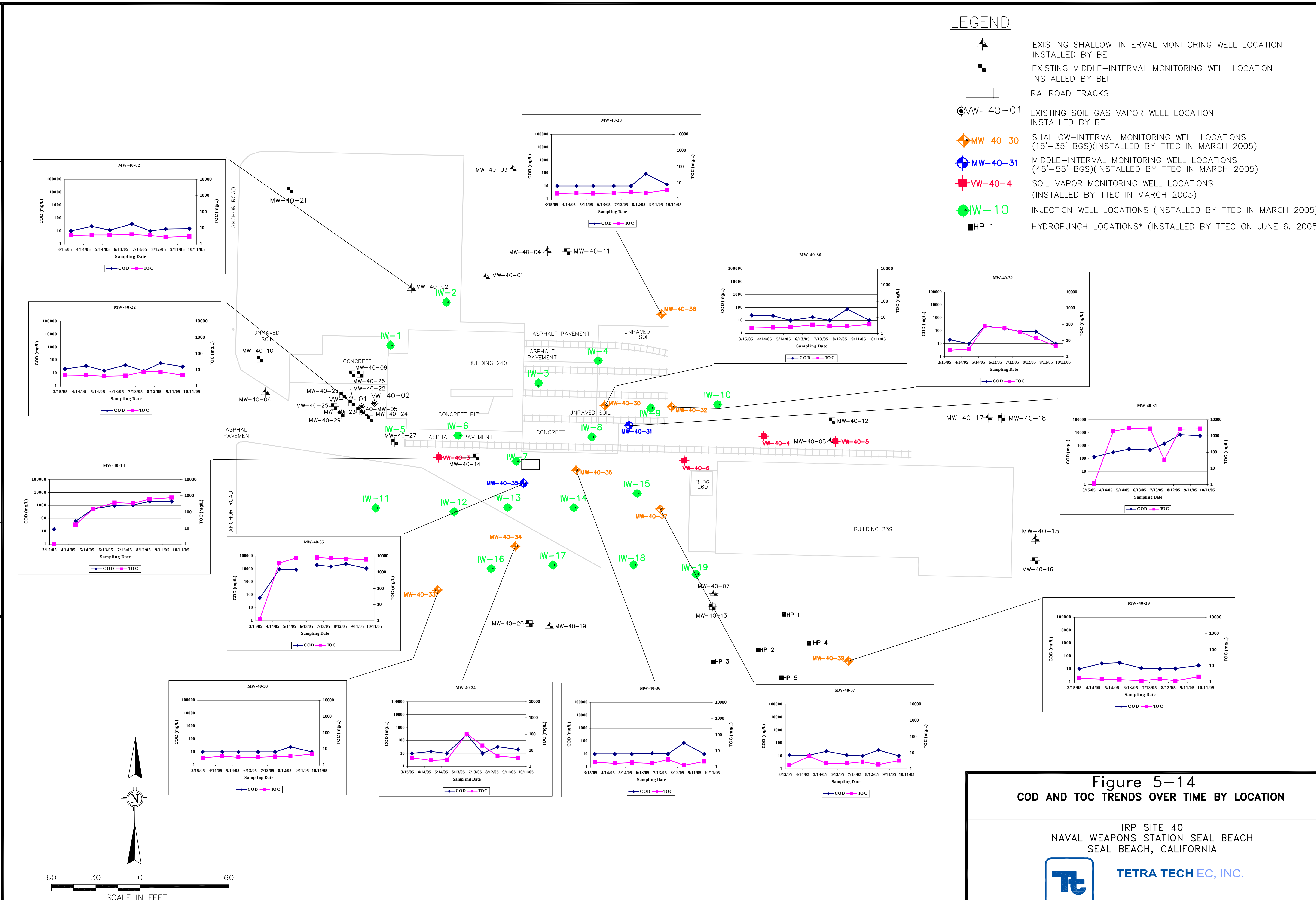

Figure 5-14
COD AND TOC TRENDS OVER TIME BY LOCATION

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169514.DWG
DCN: FWSD-RAC-06-0169
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REV: REVISION 0
DRAWN BY: MD
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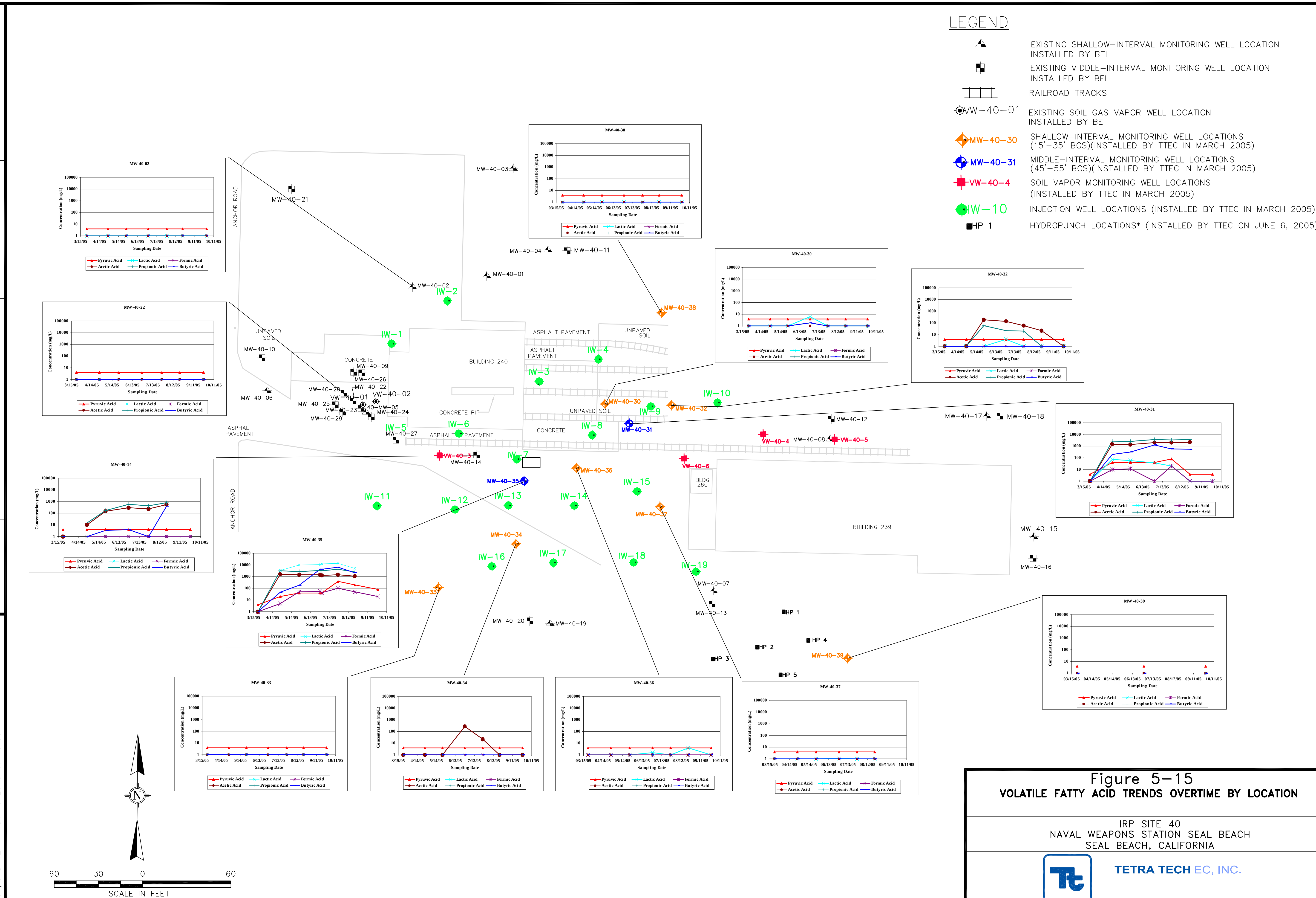

Figure 5-15
VOLATILE FATTY ACID TRENDS OVERTIME BY LOCATION

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169515.DWG
DCN: FWSD-RAC-06-0169 CTO: #0090
APPROVED BY: HH
CHECKED BY: HH REV: REVISION 0
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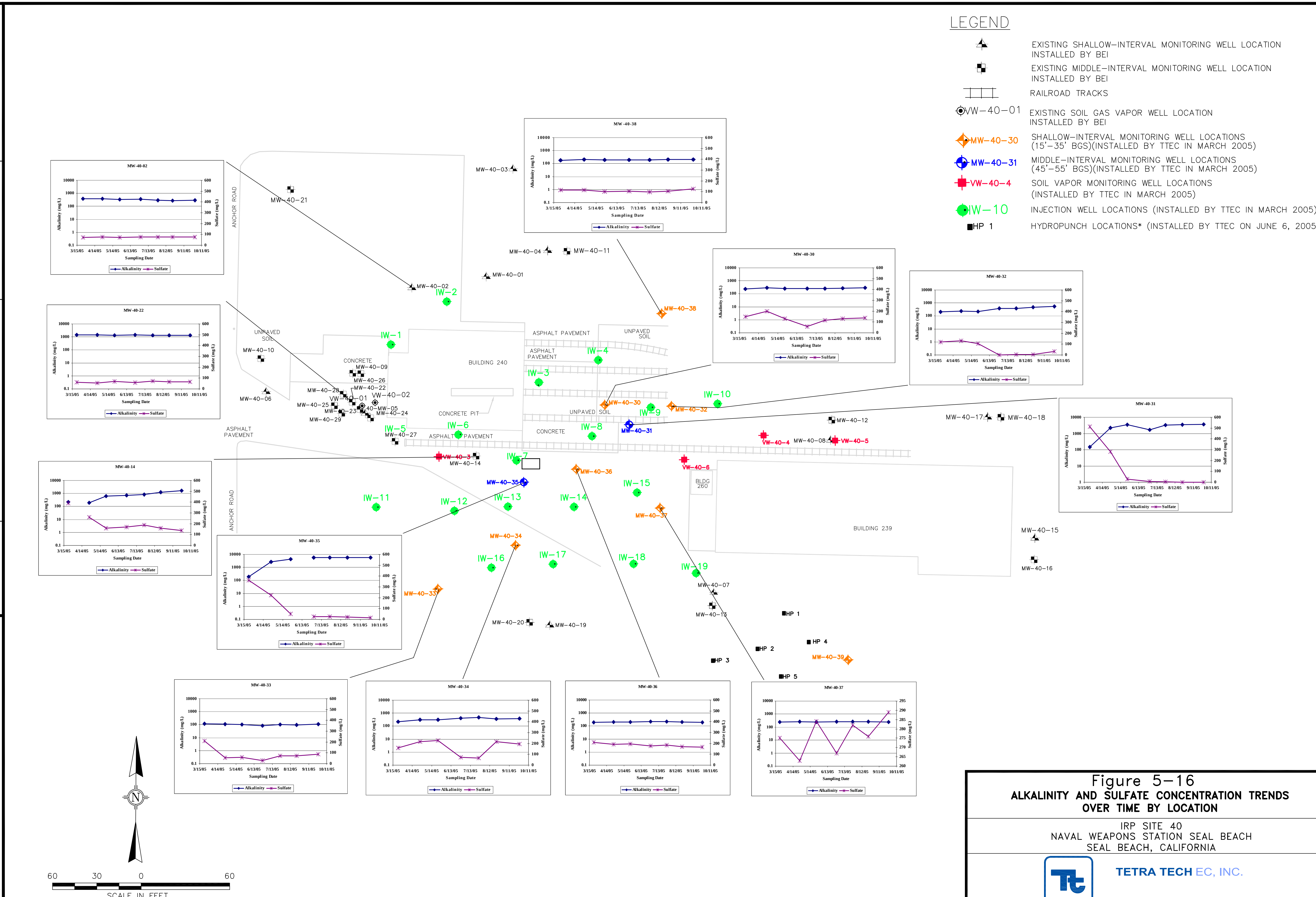

Figure 5–16
ALKALINITY AND SULFATE CONCENTRATION TRENDS OVER TIME BY LOCATION

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169516.DWG
DCN: FWSD–RAC–06–0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MT
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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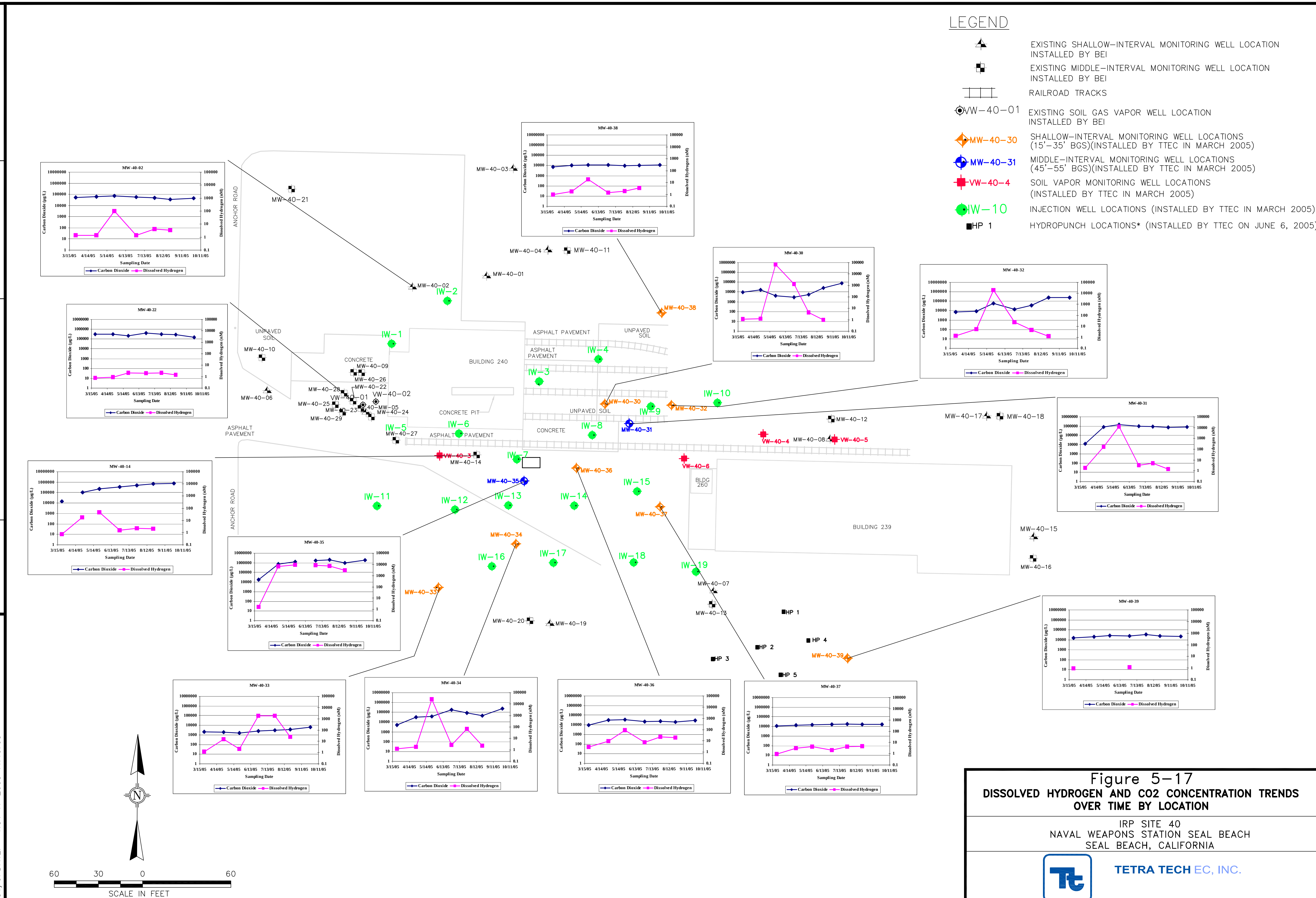

Figure 5-17
DISSOLVED HYDROGEN AND CO2 CONCENTRATION TRENDS OVER TIME BY LOCATION

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169517.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: HH
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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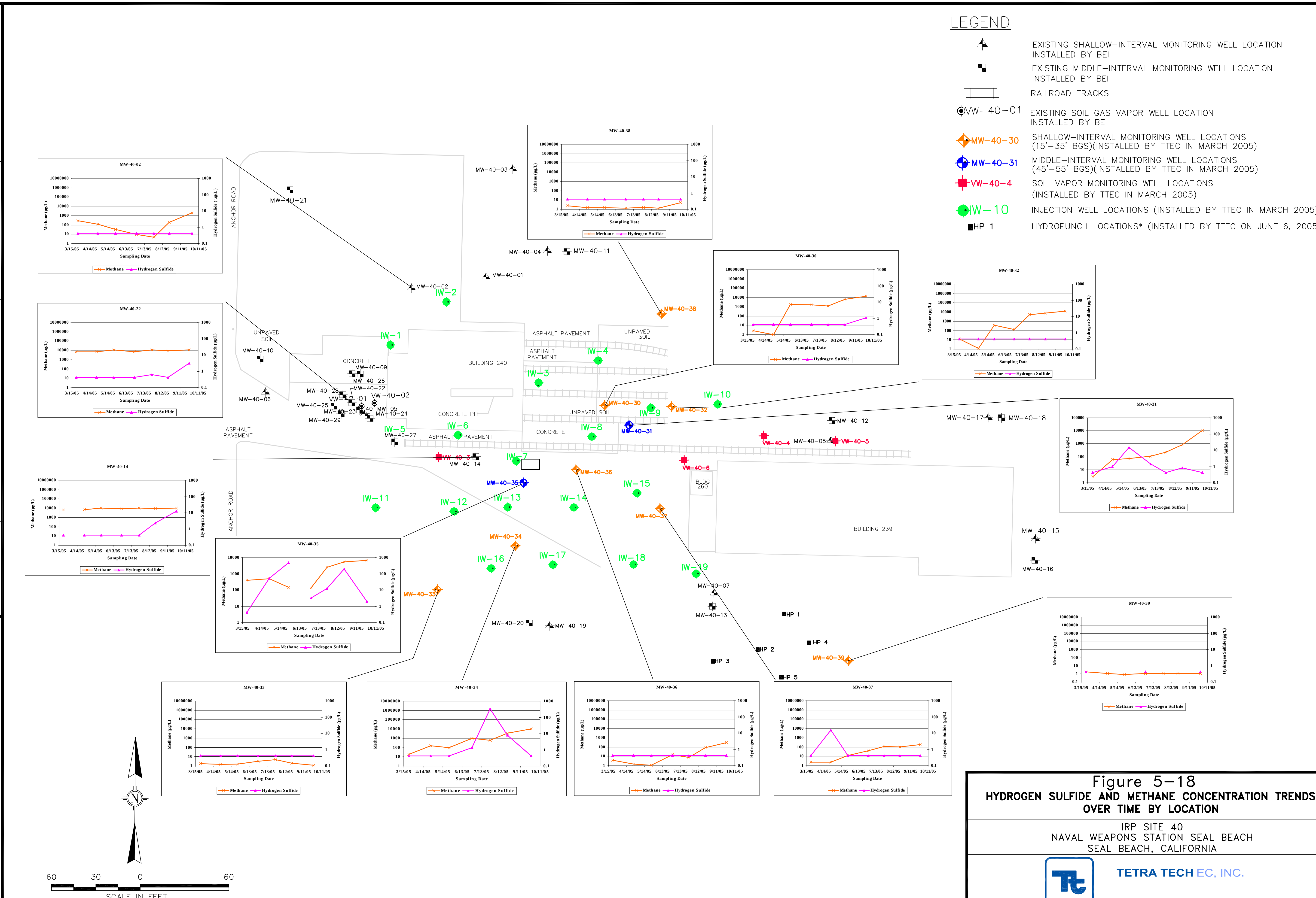

Figure 5-18
HYDROGEN SULFIDE AND METHANE CONCENTRATION TRENDS OVER TIME BY LOCATION

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169518.DWG
DCN: FWSD-RAC-06-0169 CTO: #0090
APPROVED BY: HH
CHECKED BY: HH REV: REVISION 0
DRAWN BY: MD DATE: 11/30/05

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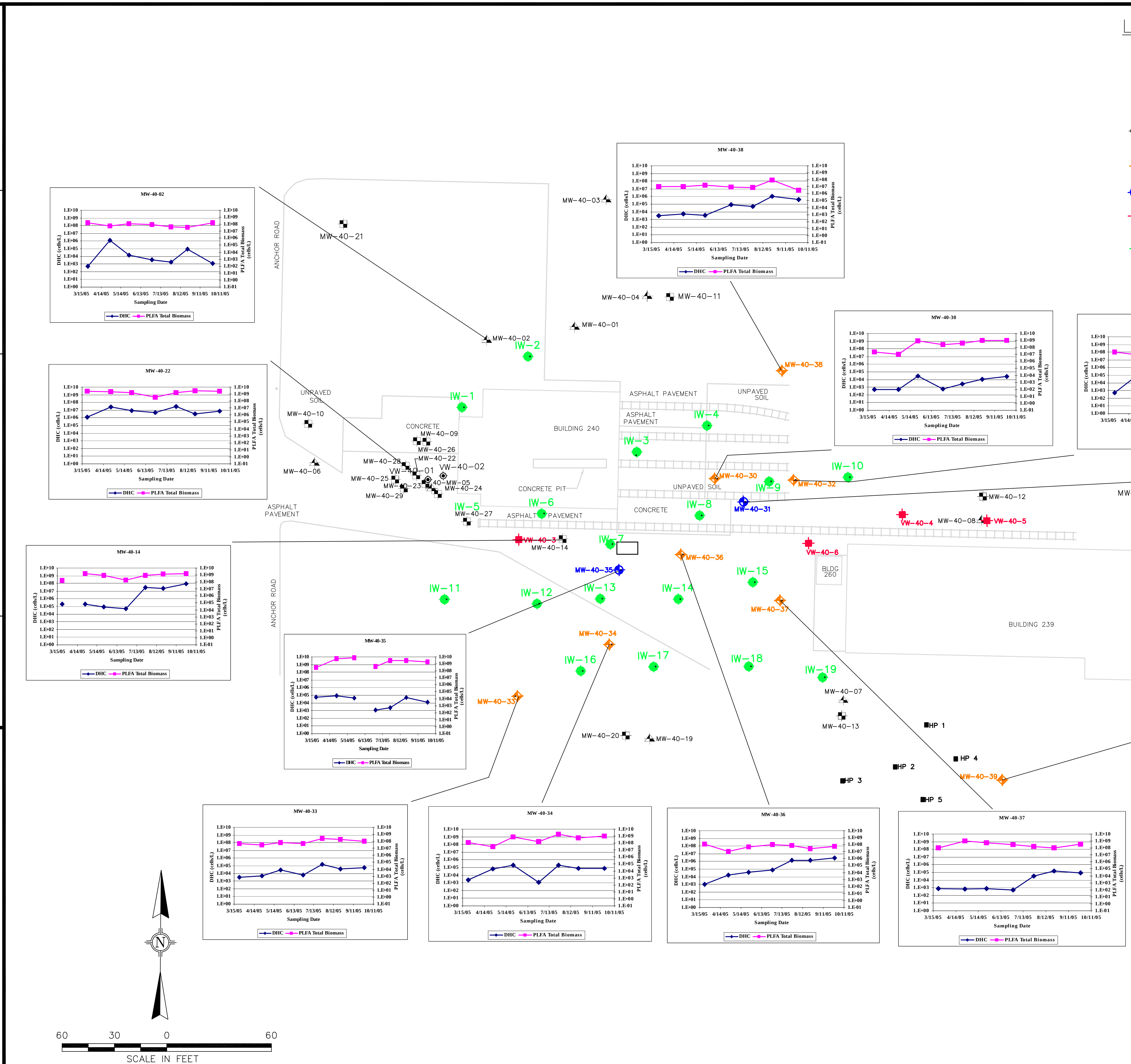

Figure 5-19
SELECT MICROBIAL PARAMETER TRENDS OVER TIME BY LOCATION

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169519.DWG
DCN: FWSD-RAC-06-0169 CTO: #0090
APPROVED BY: HH
CHECKED BY: MT REV: REVISION 0
DRAWN BY: MD DATE: 11/30/05

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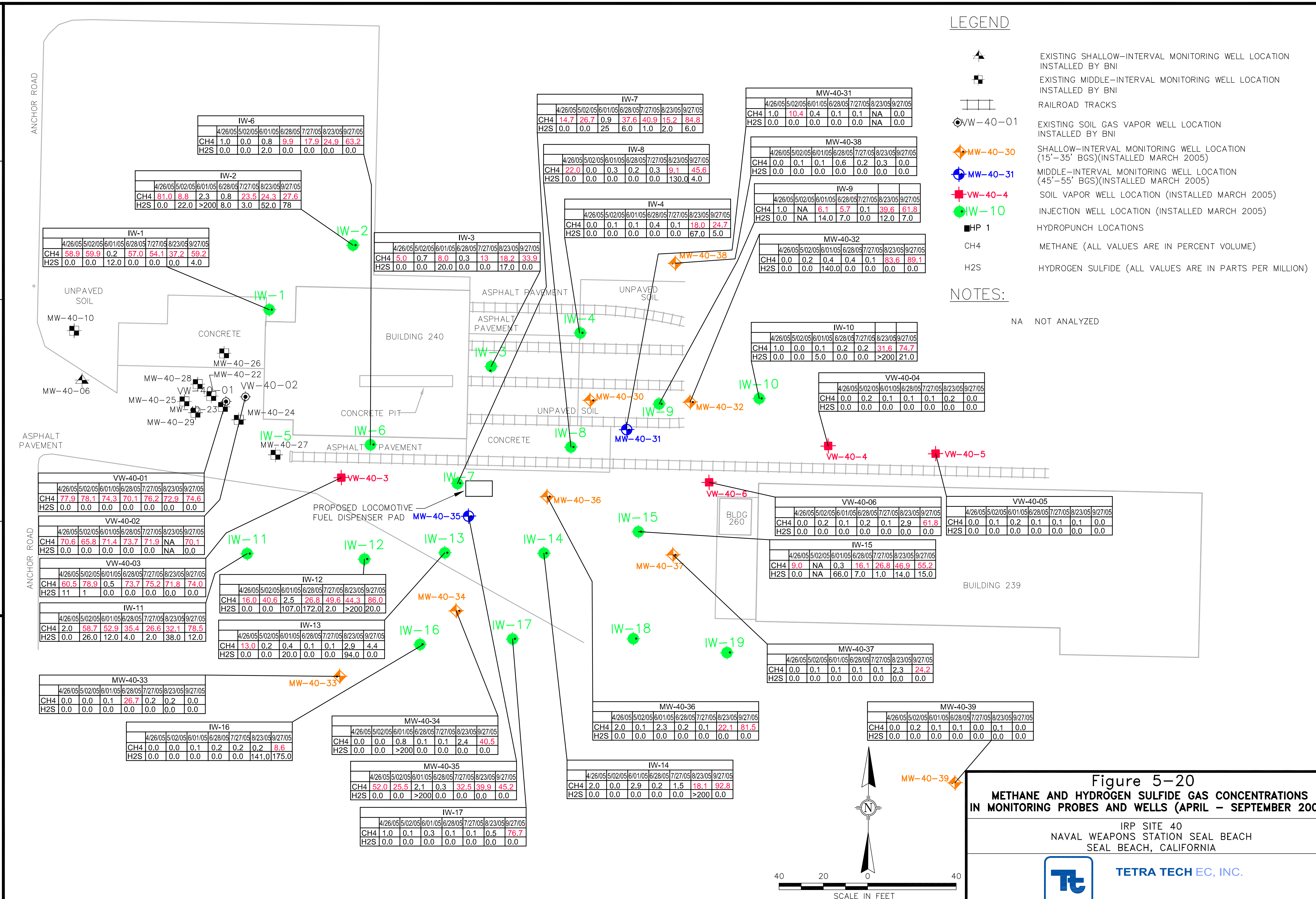

IW-6

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	1.0	0.0	0.8	9.9	17.9	24.9	63.2
H2S	0.0	0.0	2.0	0.0	0.0	0.0	0.0

IW-2

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	81.0	8.8	2.3	0.8	23.5	24.3	27.6
H2S	0.0	22.0	>200	8.0	3.0	52.0	78

IW-1

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	58.9	59.9	0.2	57.0	54.1	37.2	59.2
H2S	0.0	0.0	12.0	0.0	0.0	0.0	4.0

IW-3

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	5.0	0.7	8.0	0.3	13	18.2	33.9
H2S	0.0	0.0	20.0	0.0	0.0	17.0	0.0

IW-7

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	14.7	26.7	0.9	37.6	40.9	15.2	84.8
H2S	0.0	0.0	25	6.0	1.0	2.0	6.0

IW-8

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	22.0	0.0	0.3	0.2	0.3	9.1	45.6
H2S	0.0	0.0	0.0	0.0	0.0	130.0	4.0

IW-4

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.1	0.1	0.4	0.1	18.0	24.7
H2S	0.0	0.0	0.0	0.0	0.0	67.0	5.0

MW-40-31

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	1.0	10.4	0.4	0.1	0.1	NA	0.0
H2S	0.0	0.0	0.0	0.0	0.0	NA	0.0

MW-40-38

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.1	0.1	0.6	0.2	0.3	0.0
H2S	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IW-9

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	1.0	NA	6.1	5.7	0.1	39.6	61.8
H2S	0.0	NA	14.0	7.0	0.0	12.0	7.0

MW-40-32

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.2	0.4	0.4	0.1	83.6	89.1
H2S	0.0	0.0	140.0	0.0	0.0	0.0	0.0

IW-10

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	1.0	0.0	0.1	0.2	0.2	31.6	74.7
H2S	0.0	0.0	5.0	0.0	0.0	>200	21.0

VW-40-04

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.2	0.1	0.1	0.1	0.2	0.0
H2S	0.0	0.0	0.0	0.0	0.0	0.0	0.0

VW-40-01

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	77.9	78.1	74.3	70.1	76.2	72.9	74.6
H2S	0.0	0.0	0.0	0.0	0.0	0.0	0.0

VW-40-02

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	70.6	65.8	71.4	73.7	71.9	NA	70.1
H2S	0.0	0.0	0.0	0.0	0.0	NA	0.0

VW-40-03

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	60.5	78.9	0.5	73.7	75.2	71.8	74.0
H2S	11	1	0.0	0.0	0.0	0.0	0.0

IW-11

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	2.0	58.7	52.9	35.4	26.6	32.1	78.5
H2S	0.0	26.0	12.0	4.0	2.0	38.0	12.0

IW-12

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	16.0	40.6	2.5	26.8	49.6	44.3	86.0
H2S	0.0	0.0	107.0	172.0	2.0	>200	20.0

IW-13

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	13.0	0.2	0.4	0.1	0.1	2.9	4.4
H2S	0.0	0.0	20.0	0.0	0.0	94.0	0.0

MW-40-33

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.0	0.1	26.7	0.2	0.2	0.0
H2S	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IW-16

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.0	0.1	0.2	0.2	0.2	8.6
H2S	0.0	0.0	0.0	0.0	0.0	141.0	175.0

MW-40-34

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.0	0.8	0.1	0.1	2.4	40.5
H2S	0.0	0.0	>200	0.0	0.0	0.0	0.0

MW-40-35

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	52.0	25.5	2.1	0.3	32.5	39.9	45.2
H2S	0.0	0.0	>200	0.0	0.0	0.0	0.0

IW-17

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	1.0	0.1	0.3	0.1	0.1	0.5	76.7
H2S	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MW-40-36

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	2.0	0.1	2.3	0.2	0.1	22.1	81.5
H2S	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IW-14

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	2.0	0.0	2.9	0.2	1.5	18.1	92.8
H2S	0.0	0.0	0.0	0.0	0.0	>200	0.0

VW-40-06

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.2	0.1	0.2	0.1	2.9	61.8
H2S	0.0	0.0	0.0	0.0	0.0	0.0	0.0

VW-40-05

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.1	0.2	0.1	0.1	0.1	0.0
H2S	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IW-15

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	9.0	NA	0.3	16.1	26.8	46.9	55.2
H2S	0.0	NA	66.0	7.0	1.0	14.0	15.0

MW-40-37

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.1	0.1	0.1	0.1	2.3	24.2
H2S	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MW-40-39

	4/26/05	5/02/05	6/01/05	6/28/05	7/27/05	8/23/05	9/27/05
CH4	0.0	0.2	0.1	0.1	0.0	0.1	0.0
H2S	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 5-20

METHANE AND HYDROGEN SULFIDE GAS CONCENTRATIONS IN MONITORING PROBES AND WELLS (APRIL – SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169520.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: HH
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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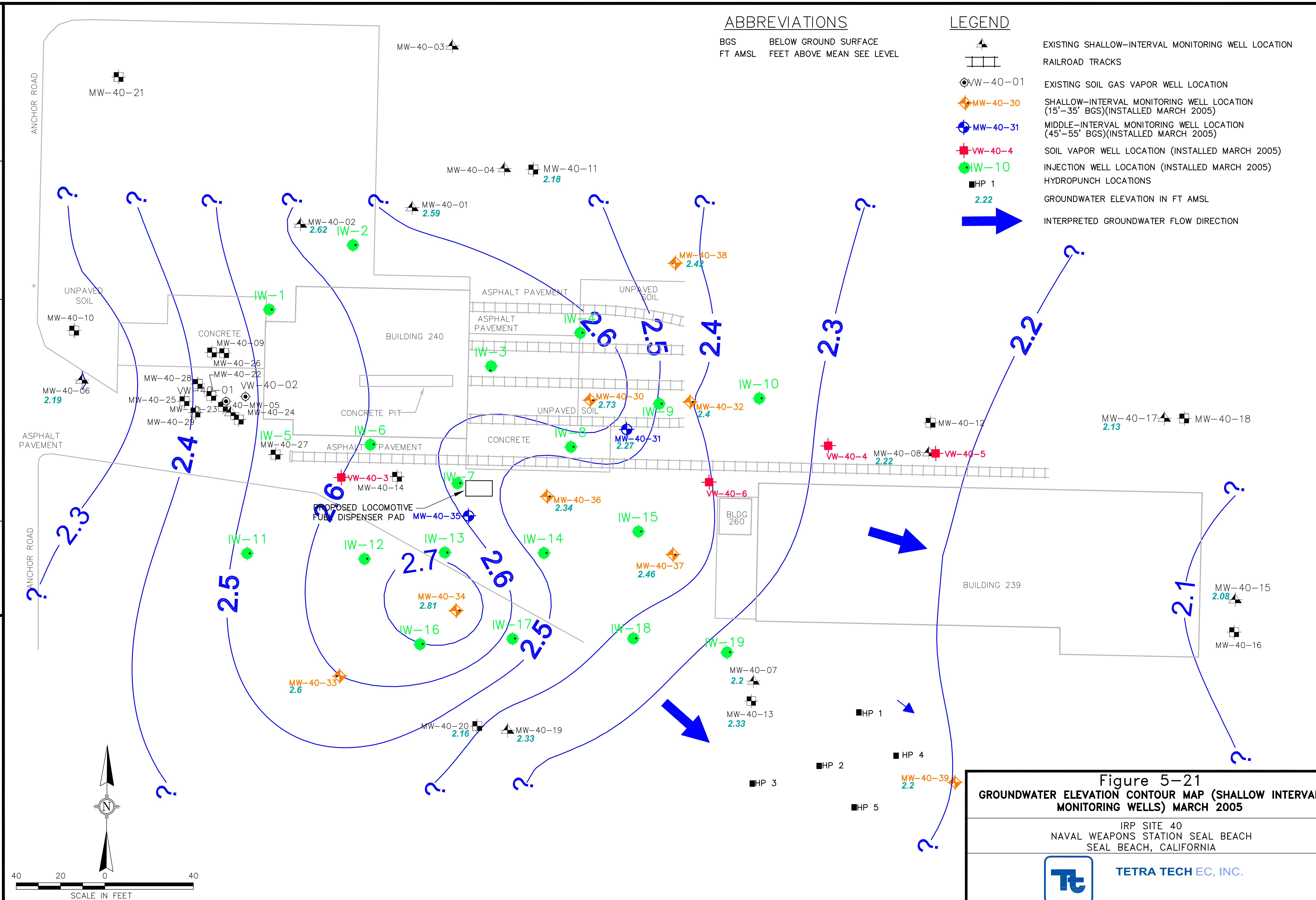

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CHECKED BY: HH REV: REVISION 0

DRAWN BY: MD DATE: 11/30/05

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PLOT/UPDATE: NOV 15 2005 09:30:32

Figure 5-21
GROUNDWATER ELEVATION CONTOUR MAP (SHALLOW INTERVAL MONITORING WELLS) MARCH 2005

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

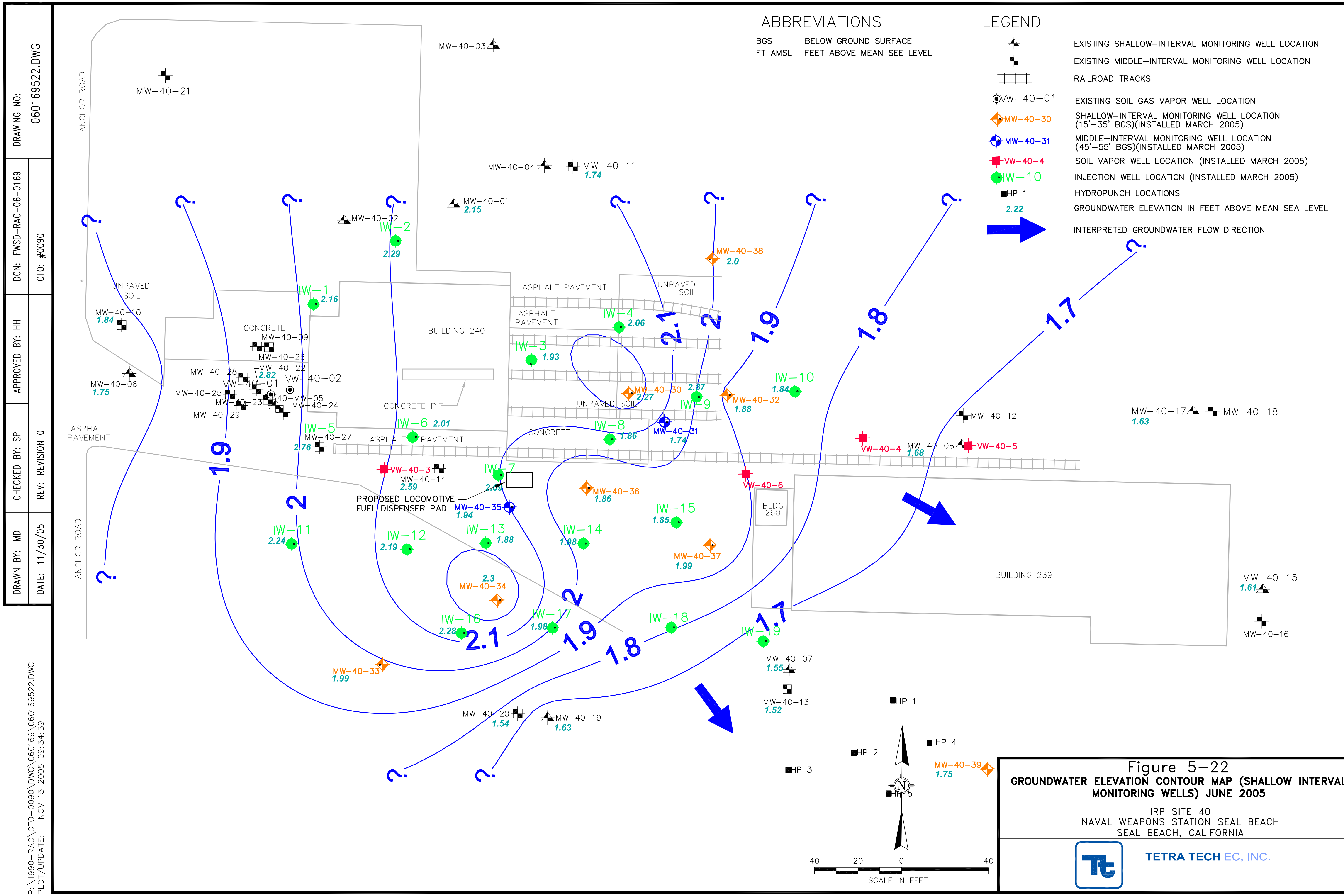

Figure 5-22
GROUNDWATER ELEVATION CONTOUR MAP (SHALLOW INTERVAL MONITORING WELLS) JUNE 2005

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

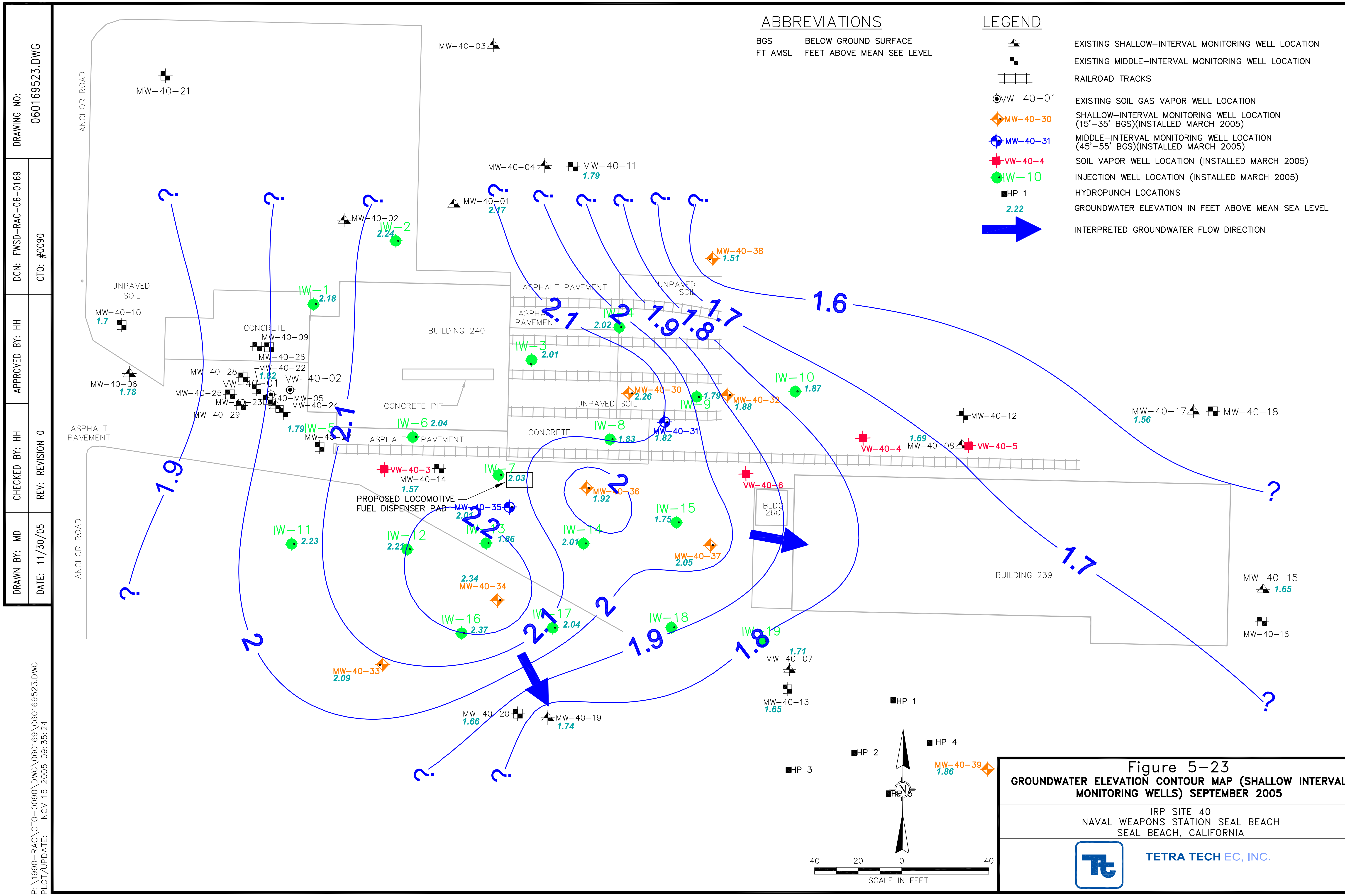

Figure 5-23
GROUNDWATER ELEVATION CONTOUR MAP (SHALLOW INTERVAL MONITORING WELLS) SEPTEMBER 2005
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

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PLOT/UPDATE: NOV 15 2005 09:37:21

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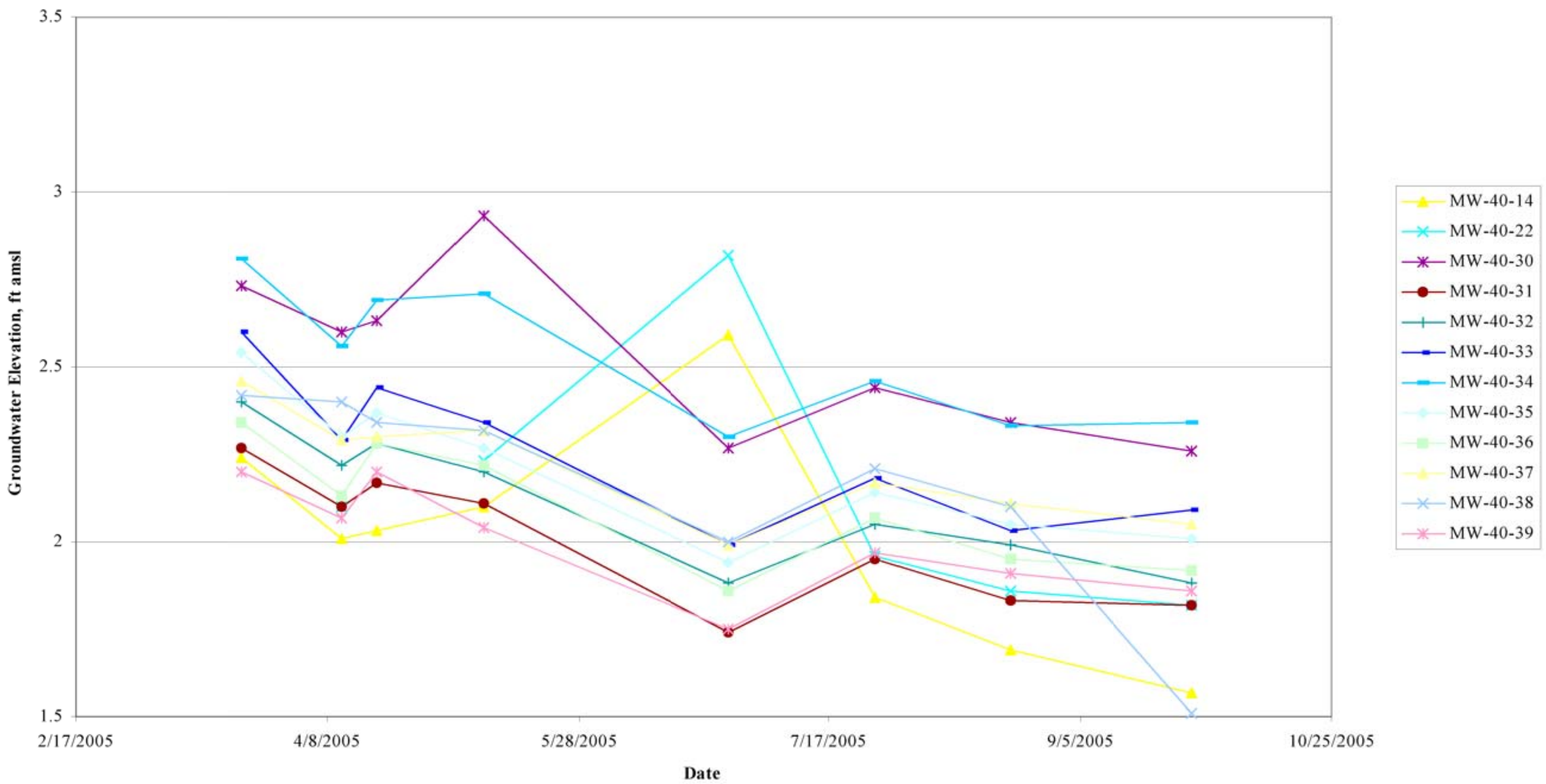

NOTE:

ft FEET

amsl ABOVE MEAN SEA LEVEL

Figure 5-24

GROUNDWATER ELEVATION TRENDS SELECT MONITORING WELLS (MARCH-SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

P:\1990-RAC\CTO-0090\DWG\060169\060169525.DWG
PLOT/UPDATE: NOV 15 2005 09:41:51

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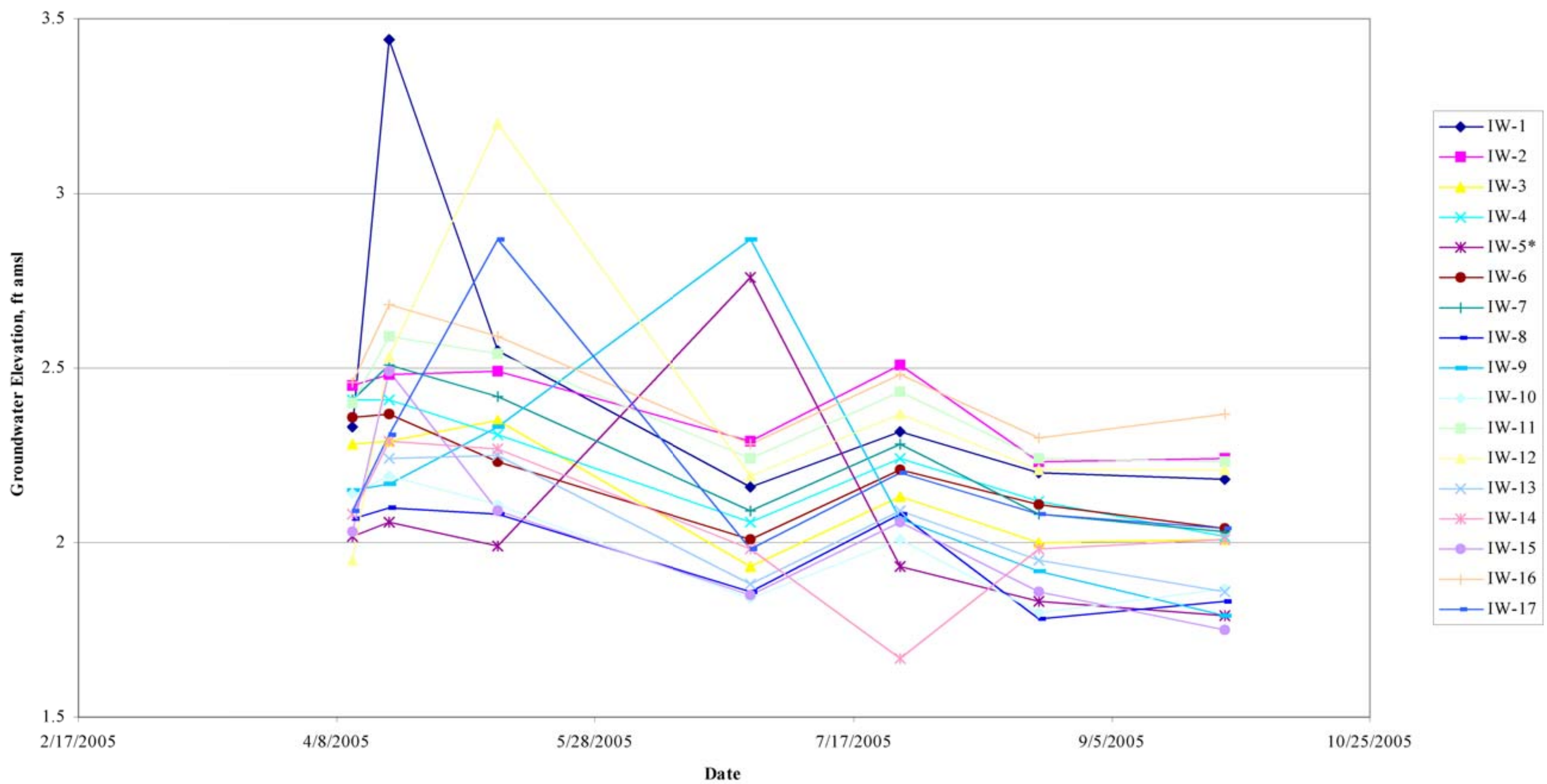


NOTE:

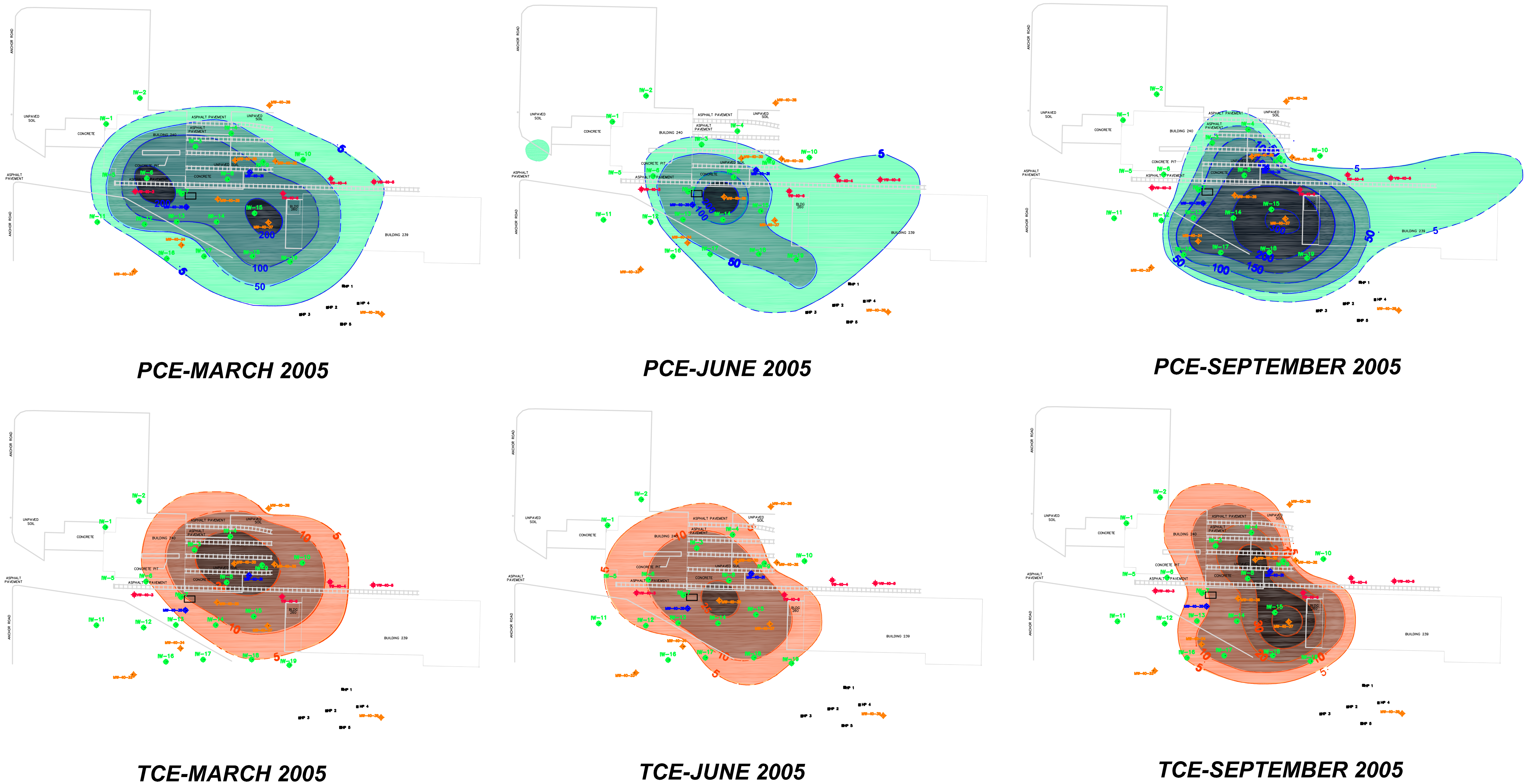
ft FEET

amsl ABOVE MEAN SEA LEVEL

Figure 5-25
GROUNDWATER ELEVATION TRENDS – INJECTION WELLS (APRIL–SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.



- 5 μg/L PCE CONCENTRATION AREA
- 50 μg/L PCE CONCENTRATION AREA
- 100 μg/L PCE CONCENTRATION AREA
- 150 μg/L PCE CONCENTRATION AREA
- 200 μg/L PCE CONCENTRATION AREA
- 5 μg/L TCE CONCENTRATION AREA
- 10 μg/L TCE CONCENTRATION AREA
- 20 μg/L TCE CONCENTRATION AREA
- 25 μg/L TCE CONCENTRATION AREA
- 30 μg/L TCE CONCENTRATION AREA

Figure 6–1
PCE AND TCE CONCENTRATION CONTOURS DEPICTING PLUME EXTENTS OVER TIME

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 06016961.DWG
DCN: FWSD-RAC-06-0169 | CTO: #0090
APPROVED BY: HH
CHECKED BY: HH | REV: REVISION 0
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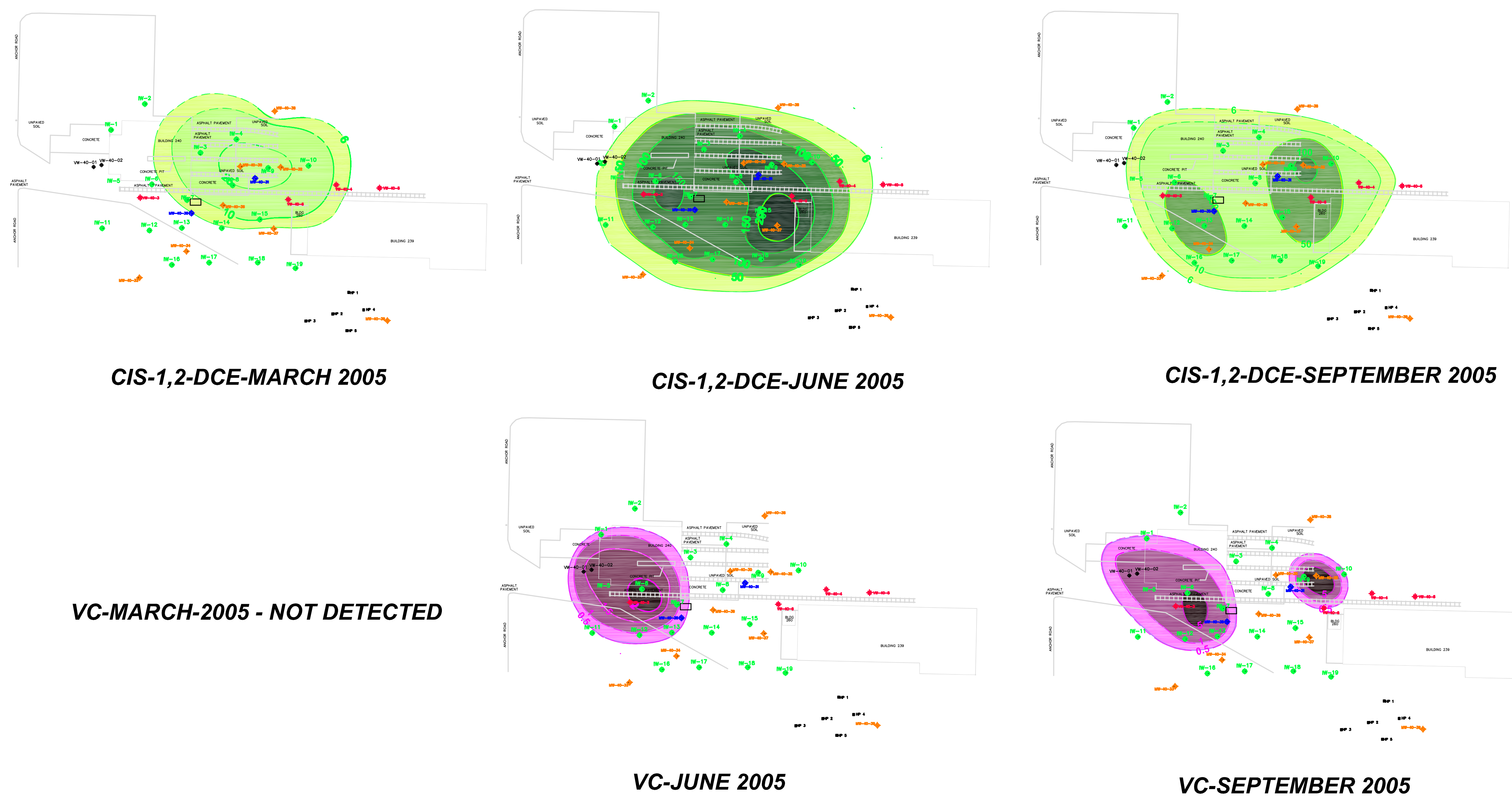
PLOT/UPDATE: NOV 15 2005 10:06:48



- 6 μg/L CIS–1,2–DCE CONCENTRATION AREA
- 10 μg/L CIS–1,2–DCE CONCENTRATION AREA
- 50 μg/L CIS–1,2–DCE CONCENTRATION AREA
- 100 μg/L CIS–1,2–DCE CONCENTRATION AREA
- 150 μg/L CIS–1,2–DCE CONCENTRATION AREA
- 200 μg/L CIS–1,2–DCE CONCENTRATION AREA
- 0.5 μg/L VC CONCENTRATION AREA
- 1 μg/L VC CONCENTRATION AREA
- 1.5 μg/L VC CONCENTRATION AREA
- 2 μg/L VC CONCENTRATION AREA
- 5 μg/L VC CONCENTRATION AREA

Figure 6–2
DCE AND VC CONCENTRATION CONTOURS DEPICTING PLUME EXTENTS OVER TIME

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 06016962.DWG
DCN: FWSD–RAC–06–0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: HH
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

P:\1990–RAC\CTO–0090\DWG\060169\06016962.DWG
PLOT/UPDATE: NOV 15 2005 10:09:13

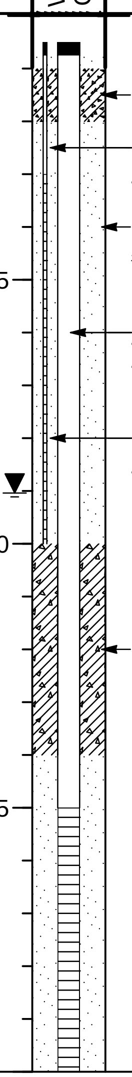
APPENDIX A

BORING AND WELL CONSTRUCTION LOGS

TETRA TECH EC, INC.

LOG OF BORING IW-1
(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,855.11 Feet (NAD 27)
Date Started: March 7, 2005	Easting: 6,002,149.28 Feet (NAD 27)
Date Completed: March 7, 2005	Ground Surface Elevation: 11.89 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 11.48 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid							0 to 1 ft. GRAVEL AND WEEDS	
		Bentonite Seal 1/2" Schedule 40 PVC Riser					ML		1 to 8 ft. SILT WITH SAND: Dark Brown to Greenish-Black, Slightly Moist, High Plasticity, 60% Non-Plastic Fines, 25% Fine Rounded to Subrounded Sand, 10% Plastic Fines, 5% Fine to Medium Rounded to Subrounded Gravel. No odor.	10
5		Filter Pack #2/16 Sand (RMC Monterey) 4"Schedule 40 PVC Riser								5
10		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP		8 to 11 ft. POORLY GRADED SAND: Light Orange Brown, Dry, Non-Plastic, 90% Fine to Medium Rounded to Subrounded Sand, 5% Fine Rounded and Subrounded Gravel, 5% Non-Plastic Fines. No Odor.	
		Bentonite Seal					ML		11 to 31 ft. SANDY SILT: Greenish-Grey, Moist, Medium Plasticity, 50% Non-Plastic Fines, 40% Fine Rounded Sand, 10% Plastic Fines. No Odor.	0
15									(All Soil Saturated Below 15' bgs.)	-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-1

(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,855.11 Feet (NAD 27)
Date Started: March 7, 2005	Easting: 6,002,149.28 Feet (NAD 27)
Date Completed: March 7, 2005	Ground Surface Elevation: 11.89 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 11.48 Feet AMSL (NAVD 29)

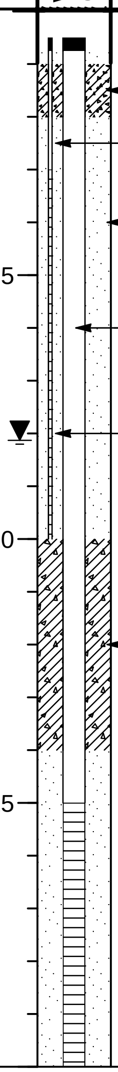
Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
20 to 31 (25, 30)		Filter Pack #2/16 Sand (RMC Monterey) 4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					ML			-10, -15
31 to 36 (35)							SM		31 to 36 ft. SILTY SAND: Greenish Brown, Saturated, Low to Medium Plasticity, 75% Fine to Medium Rounded Sand, 15% Non-Plastic Fines, 10% Plastic Fines. No Odor.	-20
36 to 38							CL		36 to 38 ft. LEAN CLAY WITH SAND: Light Brown to Brown, Moist, High Plasticity, 40% Plastic Fines, 40% Non-Plastic Fines, 20% Fine Sand. No Odor.	-25
38									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-10
(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,815.02 Feet (NAD 27)
Date Started: March 7, 2005	Easting: 6,002,370.53 Feet (NAD 27)
Date Completed: March 7, 2005	Ground Surface Elevation: 10.55 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.32 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid; Bentonite Seal; 1/2" Schedule 40 PVC Riser							0 to 4 ft. RAILROAD BALLAST - Engineered Fill: Coarse Gravel	10
5		Filter Pack #2/16 Sand (RMC Monterey); 4"Schedule 40 PVC Riser; 1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP		4 to 9 ft. POORLY GRADED SAND WITH GRAVEL: Dark Brown, Saturated, Medium Plasticity, 60% Fine to Coarse Angular to Subrounded Sand, 20% Fine to Coarse Angular to Subrounded Gravel, 10% Non-Plastic Fines, 10% Plastic Fines. No Odor.	5
10							ML		9 to 12 ft. SANDY SILT: Dark Brown, Dry, High Plasticity, 55% Non-Plastic Fines, 30% Fine Sand, 15% Plastic Fines. No Odor.	0
15		Bentonite Seal					SM		12 to 38 ft. SILTY SAND: Light Brown, Saturated, Low plasticity, 80% Fine to Medium Subrounded to Rounded Sand, 20% Non-Plastic Fines, Trace Gravel.	-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-10
(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,815.02 Feet (NAD 27)
Date Started: March 7, 2005	Easting: 6,002,370.53 Feet (NAD 27)
Date Completed: March 7, 2005	Ground Surface Elevation: 10.55 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.32 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)								-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size								-15
							SM			
30										-20
35										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TTFW WELL CONSTRUCTION (NO PID) SEAL BEACH.GPJ FSTRW_SA.GDT 10/14/05

TETRA TECH EC, INC.

LOG OF BORING IW-11

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,744.99 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,139.31 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 11.01 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.40 Feet AMSL (NAVD 29)

Well/Boring Remarks (Depth, ft. bgs, 0 to 20):
- 12" Traffic Box w/Lid
- Bentonite Seal
- 1/2" Schedule 40 PVC Riser
- Filter Pack #2/16 Sand (RMC Monterey)
- 4" Schedule 40 PVC Riser
- 1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size
- Benitonite Seal

Depth scale (ft. bgs): 5, 10, 15. Elevation scale (ft.): 10, 5, 0, -5.

USCS	LITHOLOGIC DESCRIPTION
	0 to 0.2 ft. GRAVEL FILL
CL	0.2 to 7 ft. LEAN CLAY with Sand: Reddish-Brown, Dry to Moist, Low to Non-Plastic, 80% Plastic Fines, 20% Fine Subrounded Sand. Increasing Sand With Depth. No Odor.
SM	7 to 12 ft. SILTY SAND: Brown, Moist to Wet, Non-Plastic, 60% Fine to Medium (Trace Coarse) Subrounded Sand, 40% Non-Plastic Fines, Trace Plastic Fines. No Odor.
SP-SM	12 to 14 ft. POORLY GRADED SAND WITH SILT: Grey, Moist, 90% Fine Subrounded Sand, 10% Non-Plastic Fines. Micaceous. Diesel Odor.
SM	14 to 19 ft. SILTY SAND: Light Greyish-Brown, Moist, Non-Plastic, 80% Fine Subrounded Sand, 20% Non-Plastic Fines. Micaceous. Organic Odor.
CL	19 to 20 ft. Clay/Silt lens - from 19' to 20'

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-11

(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,744.99 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,139.31 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 11.01 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.40 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)					SM		20 to 29 ft. SILTY SAND: Brown Gold, Wet, Non-Plastic, 80% Fine Subrounded Sand, 20% Non-Plastic Fines. Micaceous. No Odor.	-10
									23 to 23.5 ft. Silt lense - 6" thick at 23'	
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM		As above	-15
									28 to 29 ft. Silt lense - 1' thick at 28'	
30							SP		29 to 38 ft. POORLY GRADED SAND: Brown, Gold and Black, Saturated, Non-Plastic, Very Loose, 100% Very Fine to Fine Subrounded Sand, Trace Non-Plastic Fines. Micaceous. No Odor.	-20
35										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

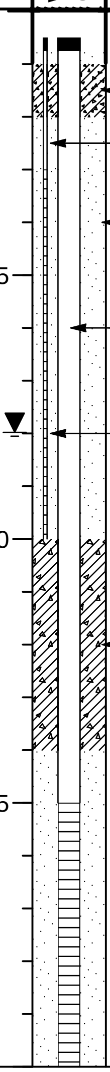
Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

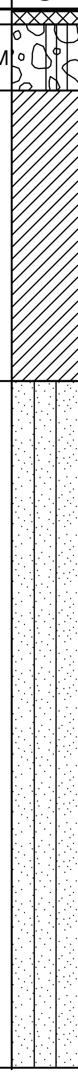
TETRA TECH EC, INC.

LOG OF BORING IW-12

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,742.52 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,192.29 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 11.05 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.51 Feet AMSL (NAVD 29)





Depth (ft. bgs)	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	LITHOLOGIC DESCRIPTION	Elevation (ft.)
	12" Traffic Box w/Lid					GP-GM	0 to 0.2 ft. GRAVEL 0.2 to 1.5 ft. POORLY GRADED GRAVEL WITH SILT and SAND: Dark Brown, Non-Plastic, 50% Medium Subrounded to Subangular Gravel, 40% Fine to Medium Subrounded to Subangular Sand, 10% Non-Plastic Fines. Some Wood and Railroad Debris.	10
	Bentonite Seal 1/2" Schedule 40 PVC Riser					CL	1.5 to 7 ft. LEAN CLAY WITH SAND: Reddish-Brown, Moist, Low Plasticity, 85% Plastic Fines, 15% Fine Subrounded Sand. No Odor.	
5	Filter Pack #2/16 Sand (RMC Monterey) 4" Schedule 40 PVC Riser						increase in amount of Sand w/depth	5
10	1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size Bentonite Seal					SM	7 to 24 ft. SILTY SAND: Brown, Moist to Wet, Non-Plastic, 55-70% Very Fine to Medium Subrounded Sand, 30-45% Non-Plastic Fines, Trace Plastic Fines. Some Micaceous. No Odor.	0
15							increase in amount of Silt w/depth	-5
							AS ABOVE: Some Clay Nodules.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.	**LOG OF BORING IW-12** (Sheet 2 of 2)
Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,742.52 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,192.29 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 11.05 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.51 Feet AMSL (NAVD 29)

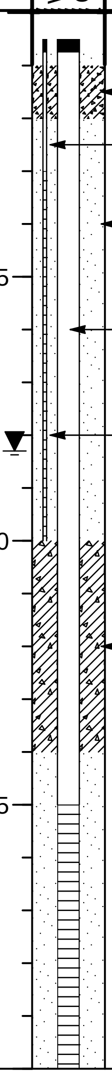
Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)					SM			-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP		24 to 38 ft. POORLY GRADED SAND: Brown, Black and Gold Speckled, Wet, Non-Plastic, 95-100% Fine Subrounded Sand, Trace to 5% Non-Plastic Fines. Micaceous. No Odor.	-15
30										-20
35										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-13
(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,745.30 Feet (NAD 27)
Date Started: February 25, 2005	Easting: 6,002,228.75 Feet (NAD 27)
Date Completed: February 25, 2005	Ground Surface Elevation: 10.80 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.54 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	LITHOLOGIC DESCRIPTION	Elevation (ft.)
	12" Traffic Box w/Lid						0 to 0.2 ft. 3" ASPHALT	
							0.2 to 0.7 ft. 6" ARTIFICIAL FILL: POORLY GRADED SAND WITH GRAVEL	10
	Bentonite Seal; 1/2" Schedule 40 PVC Riser					ML	0.7 to 4 ft. SANDY SILT: Dark Brown, Dry to Slightly Moist, Non-Plastic, 65% Non-Plastic Fines, 30% Fine Subrounded Sand, 5% Medium Subrounded Gravel, Trace Plastic Fines. No Odor.	
5	Filter Pack #2/16 Sand (RMC Monterey); 4"Schedule 40 PVC Riser					CL	4 to 7 ft. SANDY LEAN CLAY: Orange-Red Brown, Dry, Low Plasticity, 50% Plastic Fines, 30% Fine Subrounded Sand, 20% Non-Plastic Fines. No Odor.	5
10	1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size; Bentonite Seal					ML	7 to 14 ft. SILT with SAND: Brown, Moist, Non-Plastic, 50% Non-Plastic Fines, 30% Very Fine to Fine Subrounded Sand, 20% Plastic Fines. Micaceous. No Odor.	0
15						CL	14 to 19 ft. SANDY LEAN CLAY: Brown to Red Brown, Moist, Low to Non-Plastic, 45% Plastic Fines, 30% Fine Subrounded Sand, 25% Non-Plastic Fines. No Odor.	-5
						ML	19 to 24 ft. SANDY SILT WITH TRACE RED CLAY NODULES: Brown, Moist, Non-Plastic, 50% Non-Plastic	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-13
(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,745.30 Feet (NAD 27)
Date Started: February 25, 2005	Easting: 6,002,228.75 Feet (NAD 27)
Date Completed: February 25, 2005	Ground Surface Elevation: 10.80 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.54 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)					ML		Fines, 35% Fine Subrounded Sand, 15% Plastic Fines, Trace Red Clay Nodules. Micaceous. No Odor. Decreasing Clay With Depth.	-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM		24 to 29 ft. SILTY SAND: Brown, Wet, Non-Plastic, 50% Non-Plastic Fines, 50% Fine Rounded Sand, Trace Plastic Fines. Micaceous. No Odor.	-15
30							SP		29 to 38 ft. POORLY GRADED SAND: Brown, Black and Gold Speckled, Wet, Non-Plastic, 95% Fine Rounded Sand, 5% Non-Plastic Fines. Micaceous. No Odor.	-20
35										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-14

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,745.19 Feet (NAD 27)
Date Started: March 7, 2005	Easting: 6,002,273.30 Feet (NAD 27)
Date Completed: March 7, 2005	Ground Surface Elevation: 10.86 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.50 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
0		12" Traffic Box w/Lid							0 to 0.5 ft. 6" ASPHALT	
		Bentonite Seal					SM		0.5 to 7 ft. SILTY SAND: Brown to Orange Brown, Dry, Low Plasticity, 50% Fine to Coarse (Predominantly Fine) Subrounded Sand, 40% Non-Plastic Fines, 10% Plastic Fines. No Odor.	10
		1/2" Schedule 40 PVC Riser								
5		Filter Pack #2/16 Sand (RMC Monterey)								5
		4" Schedule 40 PVC Riser								
		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM		7 to 12 ft. SILTY SAND: Light Brown, Slightly Moist, Low Plasticity, 80% Predominantly Fine Rounded Sand, 15% Non-Plastic Fines, 5% Plastic Fines. No Odor.	
10										0
		Bentonite Seal					SM		12 to 20 ft. SILTY SAND: Light Brown to Greenish-Brown, Moist, Medium Plasticity, 65% Predominantly Fine Rounded Sand, 25% Non-Plastic Fines, 10% Plastic Fines. No Odor.	
15										-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-14
(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,745.19 Feet (NAD 27)
Date Started: March 7, 2005	Easting: 6,002,273.30 Feet (NAD 27)
Date Completed: March 7, 2005	Ground Surface Elevation: 10.86 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.50 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)							20 to 38 ft. SILTY SAND: Light Brown, Saturated, Low Plasticity, 80% Predominantly Fine Rounded Sand, 15% Non-Plastic Fines, 5% Plastic Fines. No Odor.	-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size								-15
30							SM			-20
35										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-15

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,754.88 Feet (NAD 27)
Date Started: February 25, 2005	Easting: 6,002,315.96 Feet (NAD 27)
Date Completed: February 25, 2005	Ground Surface Elevation: 10.93 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.63 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid							0 to 0.2 ft. 3" ASPHALT	
									0.2 to 1 ft. 9" ARTIFICIAL FILL	10
		Bentonite Seal; 1/2" Schedule 40 PVC Riser; Filter Pack #2/16 Sand (RMC Monterey); 4" Schedule 40 PVC Riser					CL		1 to 7 ft. SANDY LEAN CLAY: Dark Brown, Dry to Slightly Moist, Low plasticity, 50% Plastic Fines, 30% Fine Subrounded Sand, 20% Non-Plastic Fines, Dense. No Odor.	
5										5
		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP-SM		7 to 12 ft. POORLY GRADED SAND WITH SILT: Brown, Moist, Non-Plastic, 90% Medium to Coarse Subrounded Sand, 10% Non-Plastic Fines. No Odor.	
10										0
		Bentonite Seal					CL		12 to 13 ft. SANDY LEAN CLAY: Dark Brown, Moist, Low Plasticity, 50% Plastic Fines, 30% Fine to Medium Subrounded Sand, 20% Non-Plastic Fines.	
							SM		13 to 19 ft. SILTY SAND: Brown, Wet, Non-Plastic, Loose, 55% Medium to Coarse Subrounded to Subangular Sand, 45% Non-Plastic Fines. No Odor.	
15										-5
							SM		19 to 38 ft. SILTY SAND: Brown, Wet, Non-Plastic, Loose, 70% Fne to Medium Subrounded Sand, 30%	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-15

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,754.88 Feet (NAD 27)
Date Started: February 25, 2005	Easting: 6,002,315.96 Feet (NAD 27)
Date Completed: February 25, 2005	Ground Surface Elevation: 10.93 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.63 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
									Non-Plastic Fines. No Odor.	
		Filter Pack #2/16 Sand (RMC Monterey)								-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size								-15
							SM			
30										-20
35										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-16

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,704.00 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,217.36 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 11.15 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.46 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid							0 to 0.2 ft. GRAVEL FILL: 100% Coarse Angular Gravel	
		Bentonite Seal							0.2 to 1 ft. SAND AND GRAVEL FILL: 75% Fine to Medium Subrounded Sand, 20% Medium Gravel, 5% Non-Plastic Fines. No Odor.	10
		1/2"Schedule 40 PVC Riser					CL		1 to 7 ft. SANDY LEAN CLAY: Reddish-Brown, Dry to Moist, Non-Plastic, 60% Plastic Fines, 40% Mostly Fine to Medium Subrounded Sand. No Odor.	
5		Filter Pack #2/16 Sand (RMC Monterey)							increase in Sand content w/depth	
		4" Schedule 40 PVC Riser								5
		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM		7 to 20 ft. SILTY SAND: Brown, Wet, Non-Plastic, 60-70% Fine Sand With Trace Coarse Subrounded Sand, 30% Non-Plastic Fines, 10% Plastic Fines. No Odor.	
10										0
		Bentonite Seal								
15										-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-16

(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,704.00 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,217.36 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 11.15 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.46 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)					SP-SM		20 to 25 ft. POORLY GRADED SAND WITH SILT: Brown, Black and Gold, Wet, Non-Plastic, 90% Fine Subrounded Sand, 10% Non-Plastic Fines. No Odor.	-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP		25 to 38 ft. POORLY GRADED SAND: Brown, Black and Gold, Wet, Non-Plastic, 95-100% Very Fine to Fine Subrounded Sand, Trace-5% Non-Plastic Fines. No Odor.	-15
30										-20
35									decrease in amount of plastic fines w/depth	-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

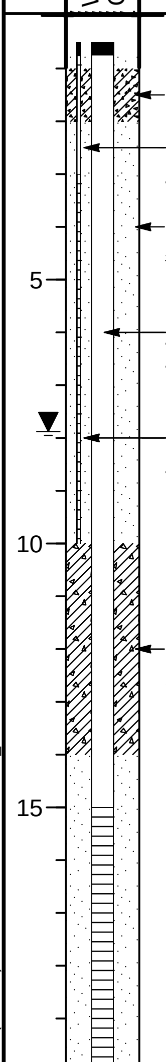
Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-17

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,706.46 Feet (NAD 27)
Date Started: March 1, 2005	Easting: 6,002,259.14 Feet (NAD 27)
Date Completed: March 1, 2005	Ground Surface Elevation: 10.59 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.19 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	LITHOLOGIC DESCRIPTION	Elevation (ft.)
0	12" Traffic Box w/Lid					GP	0 to 0.5 ft. POORLY GRADED GRAVEL: Grey, Dry, 100% Coarse Angular Gravel.	10
	Bentonite Seal					GM	0.5 to 2 ft. SILTY GRAVEL with SAND: Dark Grey, Moist, Non-Plastic, 60% Coarse Angular Gravel, 25% Non-Plastic Fines, 15% Fine to Medium Angular Sand. Hydrocarbon Staining and Slight Diesel Odor.	
5	1/2" Schedule 40 PVC Riser; Filter Pack #2/16 Sand (RMC Monterey); 4" Schedule 40 PVC Riser					CL	2 to 8 ft. LEAN CLAY with SAND: Reddish-Brown, Dry to Moist, Low Plasticity, 80% Plastic Fines, 20% Very Fine to Medium Subrounded Sand. No Odor.	5
10	1/2" Schedule 40 PVC; Factory-Slotted Screen 0.010" Slot-Size; Bentonite Seal					SM	8 to 13 ft. SILTY SAND: Reddish-Brown to Brown, Wet, Non-Plastic, 60% Fine to Medium Subrounded Sand, 35% Non-Plastic Fines, 5% Medium Gravel, Trace Plastic Fines. Micaceous. No Odor.	0
15						SM	13 to 19 ft. SILTY SAND: Brown, Moist, Non-Plastic, 70% Fine to Medium Subrounded Sand, 30% Non-Plastic Fines. Micaceous. No Odor.	-5
						CL	19 to 20 ft. CLAY LENS	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-17

(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,706.46 Feet (NAD 27)
Date Started: March 1, 2005	Easting: 6,002,259.14 Feet (NAD 27)
Date Completed: March 1, 2005	Ground Surface Elevation: 10.59 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.19 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
20–29		Filter Pack #2/16 Sand (RMC Monterey)					SM		20 to 29 ft. SILTY SAND: Brown, Moist to Wet, Non-Plastic, 70% Fine to Medium Subrounded Sand, 30% Non-Plastic Fines. Micaceous. No Odor.	-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size								-15
29–38							SP		29 to 38 ft. POORLY GRADED SAND: Brown, Black and Gold, Saturated, Non-Plastic, 95-100% Fine Subrounded Sand, Trace-5% Non-Plastic Fines. Micaceous. No Odor.	
30										-20
35										-25
38									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

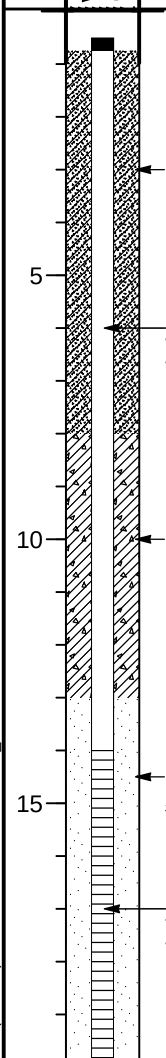
Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-18

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 10 in.
Geologist: J. Brenner	Northing: 2,218,706.64 Feet (NAD 27)
Date Started: August 19, 2005	Easting: 6,002,310.30 Feet (NAD 27)
Date Completed: August 19, 2005	Ground Surface Elevation: N/A
Total Depth: 35.0 Feet bgs	Top of Casing Elevation: N/A



Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
12" Traffic Box w/Lid							0 to 0.2 ft. 3" ASPHALT	
Bentonite Grout					SM		0.2 to 5 ft. ARTIFICIAL FILL: Dark Brown to Orange Brown, Dry, Loose, Soft, Non-Plastic, 60% Sand, 40% Non-Plastic Fines	
4" Schedule 40 PVC Riser					ML		5 to 8 ft. SILT WITH SAND: Dark Brown, Dry, Moderately Dense, Moderately Sitff, Low Plasticity, 75% Non-Plastic fines, 15% Fine Rounded Sand, 10% Plastic Fines	
Bentonite Seal					SM		8 to 13 ft. SILTY SAND: Brown, Moist, Loose, Soft, Non-Plastic, 80% Fine Rounded Sand20% Non-Plastic Fines	
Filter Pack #2/16 Sand (RMC Monterey) 4" Schedule 40 PVC Factory-Slotted Screen					SM		13 to 18 ft. SILTY SAND: Light Brown to Tan, Wet, Moderately Dense, Moderately Stiff, Low Plasticity, 65% Fine Rounded Sand, 20% Non-Plastic Fines, 15% Plastic Fines	
0.010" Slot-Size					SP		18 to 35 ft. POORLY GRADED SAND WITH SILT: Light Brown, Wet, Very Loose, Soft, Non-Plastic, 80% Fine Rounded Sand, 20% Non-Plastic Fines	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

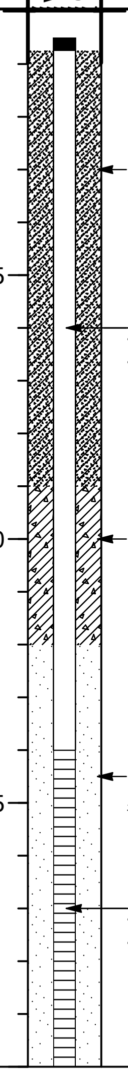
LOG OF BORING IW-18
(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 10 in.
Geologist: J. Brenner	Northing: 2,218,706.64 Feet (NAD 27)
Date Started: August 19, 2005	Easting: 6,002,310.30 Feet (NAD 27)
Date Completed: August 19, 2005	Ground Surface Elevation: N/A
Total Depth: 35.0 Feet bgs	Top of Casing Elevation: N/A

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
25										
							SP			
30										
35									Boring terminated at total depth of 35 feet bgs.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.	**LOG OF BORING IW-19** (Sheet 1 of 2)
Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 10 in.
Geologist: W. Bryant	Northing: 2,218,699.92 Feet (NAD 27)
Date Started: September 10, 2005	Easting: 6,002,354.87 Feet (NAD 27)
Date Completed: September 10, 2005	Ground Surface Elevation: N/A
Total Depth: 35.0 Feet bgs	Top of Casing Elevation: N/A



Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
0		12" Traffic Box w/Lid							0 to 0.2 ft. 3" ASPHALT	
							SP-SM		0.2 to 2 ft. POORLY GRADED SAND WITH SILT AND GRAVEL: Arificial Fill, Grey, Dry, Non-Plastic, 60% Fine to Medium Subrounded Sand, 30% Fine to Medium Subrounded Gravel, 10% Non-Plastic Fines, Maximum Gravel Size 1"	
		Bentonite Grout					ML		2 to 5 ft. SILT WITH SAND: Dark Brown, Moist, Non-Plastic, 85% Non-Plastic Fines, 15% Fine Rounded Sand	
5		4" Schedule 40 PVC Riser					ML		5 to 12 ft. SILT WITH SAND: Brown, Moist, Low Plasticity, 75% Non-Plastic Fines, 15% Fine Rounded Sand, 10% Plastic Fines	
10		Bentonite Seal								
							SM		12 to 16 ft. SILTY SAND: Brown, Wet, Non-Plastic, 80% Fine Rounded Sand, 20% Non-Plastic	
15		Filter Pack #2/16 Sand (RMC Monterey)								
		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM		16 to 22 ft. SILTY SAND: Light Brown, Wet, Low Plasticity, 70% Fine Rouinded Sand, 20% Non-Plastic Fines, 10% Plastic Fines	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-19
(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 10 in.
Geologist: W. Bryant	Northing: 2,218,699.92 Feet (NAD 27)
Date Started: September 10, 2005	Easting: 6,002,354.87 Feet (NAD 27)
Date Completed: September 10, 2005	Ground Surface Elevation: N/A
Total Depth: 35.0 Feet bgs	Top of Casing Elevation: N/A

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
							SM			
25							SP		22 to 35 ft. POORLY GRADED SAND WITH SILT: Brown to Dark Grey, Wet, Non-Plastic, 90% Fine Rounded Sand, 10% Non-Plastic Fines	
30										
35									Boring terminated at total depth of 35 feet bgs.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

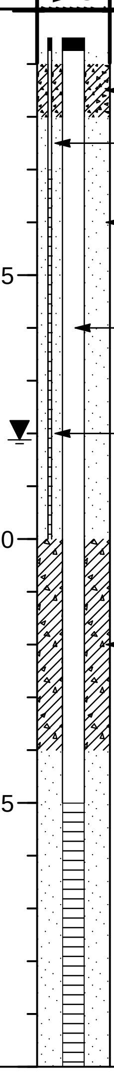
TTFW WELL CONSTRUCTION (NO PID) SEAL BEACH.GPJ FSTRW_SA.GDT 10/14/05

TETRA TECH EC, INC.

LOG OF BORING IW-2

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,884.21 Feet (NAD 27)
Date Started: March 7, 2005	Easting: 6,002,187.10 Feet (NAD 27)
Date Completed: March 7, 2005	Ground Surface Elevation: 11.31 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.60 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	LITHOLOGIC DESCRIPTION	Elevation (ft.)
0–8	12" Traffic Box w/Lid; Bentonite Seal; 1/2" Schedule 40 PVC Riser; Filter Pack #2/16 Sand (RMC Monterey); 4" Schedule 40 PVC Riser					SM	0 to 8 ft. SILTY SAND: Dark Brown, Dry, Low Plasticity, 70% Fine to Medium Subrounded to Rounded Sand, 25% Non-Plastic Fines, 5% Plastic Fines, Trace Gravel. No Odor.	10, 5
8–13	1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size; Bentonite Seal					SM	8 to 13 ft. SILTY SAND: Brown to Greenish-Brown, Moist, Low Plasticity, 80% Predominantly Fine Rounded Sand, 15% Non-Plastic Fines, 5% Plastic Fines. No Odor.	0
13–32						SM	13 to 32 ft. SILTY SAND: Greenish-Brown, Saturated, Low Plasticity, 70% Predominantly Fine Rounded Sand, 20% Non-Plastic Fines, 10% Plastic Fines. No Odor.	-5

Depth scale: 5, 10, 15

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-2

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,884.21 Feet (NAD 27)
Date Started: March 7, 2005	Easting: 6,002,187.10 Feet (NAD 27)
Date Completed: March 7, 2005	Ground Surface Elevation: 11.31 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.60 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)								-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM			-15
30										-20
35							SM		32 to 38 ft. SILTY SAND: Brown to Dark Brown, Saturated, Low to Medium Plasticity, 85% Fine to Medium Rounded Sand, 10% Non-Plastic Fines, 5% Plastic Fines, Trace Gravel. No Odor.	-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

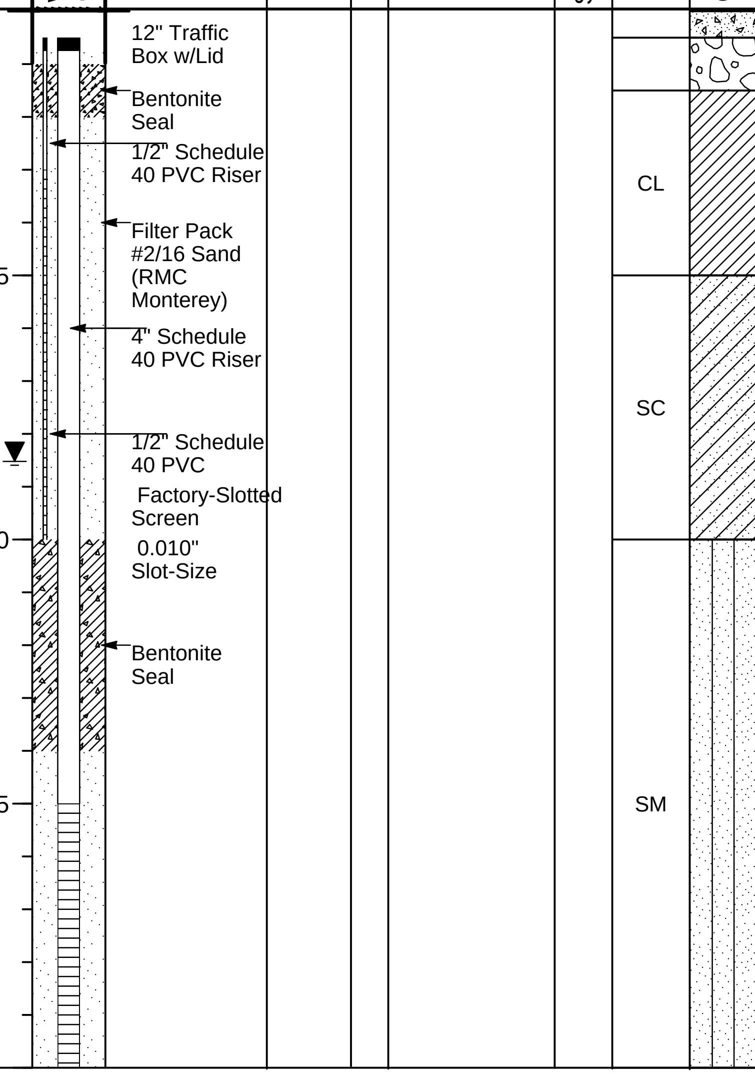
Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-3

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,829.51 Feet (NAD 27)
Date Started: February 28, 2005	Easting: 6,002,249.47 Feet (NAD 27)
Date Completed: February 28, 2005	Ground Surface Elevation: 11.17 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.81 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	LITHOLOGIC DESCRIPTION	Elevation (ft.)
	12" Traffic Box w/Lid						0 to 0.5 ft. CONCRETE	
							0.5 to 1.5 ft. GRAVEL FILL	10
	Bentonite Seal					CL	1.5 to 5 ft. LEAN CLAY wtih SAND: Dark Grey to Dark Brown, Moist, Medium to Low Plasticity, 80-95% Plastic Fines, 5-20% Very Fine to Medium Sand. Hydrocarbon Staining and Diesel Odor at top of layer.	
	1/2" Schedule 40 PVC Riser							
	Filter Pack #2/16 Sand (RMC Monterey)						increasing amount of Sand w/depth	
5						SC	5 to 10 ft. CLAYEY SAND: Light Brown to Brown, Moist, Low to Medium Plasticity, 55% Fine to Medium Sand, 35% Plastic Fines, 20% Non-Plastic Fines. No Odor.	5
	4" Schedule 40 PVC Riser							
	1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size							
10						SM	10 to 20 ft. SILTY SAND: Brown, Wet, Non-Plastic, 70-75% Fine to Medium Subrounded Sand, 25-30% Non-Plastic Fines. No Odor.	0
	Bentonite Seal							
15								-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-3
(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,829.51 Feet (NAD 27)
Date Started: February 28, 2005	Easting: 6,002,249.47 Feet (NAD 27)
Date Completed: February 28, 2005	Ground Surface Elevation: 11.17 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.81 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)							20 to 30 ft. SILTY SAND: Brown, Black, Gold, Wet, Non-Plastic, 70% Fine Subrounded Sand, 30% Non-Plastic Fines. Micaceous. No Odor.	-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM			-15
30							SP-SM		30 to 37 ft. POORLY GRADED SAND WITH SILT: Brown, Black, Gold Speckled, Wet, Non-Plastic, 90% Fine Subrounded Sand,10% Non-Plastic Fines. Micaceous. No Odor.	-20
35										-25
							SP		37 to 38 ft. POORLY GRADED SAND: Orange Brown, Wet, 100% Medium to Coarse Subrounded Sand. Micaceous. No Odor.	
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

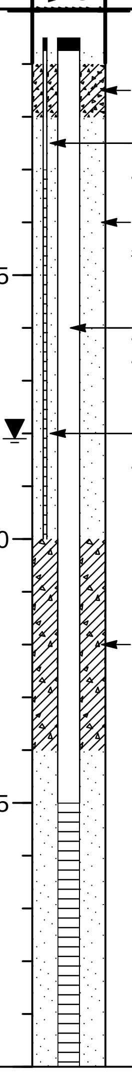
Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TTFW WELL CONSTRUCTION (NO PID) SEAL BEACH.GPJ FSTRW_SA.GDT 10/14/05

TETRA TECH EC, INC.

LOG OF BORING IW-4
(Sheet 1 of 3)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,844.59 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,289.72 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 10.97 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.51 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	LITHOLOGIC DESCRIPTION	Elevation (ft.)
0–2	12" Traffic Box w/Lid; Bentonite Seal					GP	0 to 2 ft. POORLY GRADED GRAVEL: Grey, Dry, 100% Coarse Angular Gravel. Gravel Fill.	10
2–5	1/2" Schedule 40 PVC Riser; Filter Pack #2/16 Sand (RMC Monterey)					CL	2 to 5 ft. LEAN CLAY with SAND: Reddish to Dark Brown, Moist, Low Plasticity, 85% Plastic Fines, 15% Fine to Medium Subrounded Sand. No Odor.	
5–9	4" Schedule 40 PVC Riser					SP	5 to 9 ft. POORLY GRADED SAND: Orangish-Brown, Moist, Loose, Non-Plastic, 95% Fine to Medium Subrounded Sand, 5% Non-Plastic Fines. No Odor.	5
9–15	1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size; Bentonite Seal					SP	9 to 15 ft. POORLY GRADED SAND: Orangish- Brown, Wet, Loose, Non-Plastic, 95% Fine to Medium Subrounded Sand, 5% Non-Plastic Fines. No Odor.	0
15–20						SM	15 to 20 ft. SILTY SAND: Brown, Wet, Very Loose, Non-Plastic, 80% Fine Subrounded Sand, 20% Non-Plastic Fines. Micaceous. No Odor.	-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-4

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,844.59 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,289.72 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 10.97 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.51 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)							20 to 37 ft. POORLY GRADED SAND WITH SILT: Brown, Wet, Very Loose, Non-Plastic, 90% Fine Subrounded Sand, 10% Non-Plastic Fines. Micaceous. No Odor.	-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size								-15
							SP-SM			
30										-20
35										-25
							SP		37 to 38 ft. POORLY GRADED SAND WITH GRAVEL: Brown, Wet, Very Loose, Non-Plastic, 85% Medium to Coarse Subrounded to Subangular Sand, 15% Medium to Coarse Subrounded to Subangular Gravel, Trace Non-Plastic Fines. Micaceous. No Odor.	
									Boring terminated at total depth of 38 feet bgs. Additional	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-4

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,844.59 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,289.72 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 10.97 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.51 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
									footage required to compensate for heaving formation conditions.	
										-30
45										
										-35
50										
										-40
55										
										-45

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-6

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,794.10 Feet (NAD 27)
Date Started: March 1, 2005	Easting: 6,002,194.98 Feet (NAD 27)
Date Completed: March 1, 2005	Ground Surface Elevation: 11.33 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.93 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid							0 to 0.2 ft. 2" ASPHALT	
		Bentonite Seal					SP		0.2 to 1 ft. ARTIFICIAL FILL (Poorly-graded Sand w/Gravel): Light Brown, Dry to Moist, 70% Medium Rounded Sand, 20% Medium to Coarse Rounded Gravel, 10% Non-Plastic Fines. No Odor.	10
		1/2" Schedule 40 PVC Riser							1 to 13 ft. LEAN CLAY with SAND: Reddish Brown to Dark Grey, Moist, Low to Non-Plastic, 60-80% Plastic Fines, 15% Non-Plastic Fines, 15-40% Fine to Medium Round Sand. Sand Increases with Depth. Hydrocarbon Staining and Slight Odor at 1' to 1.5' bgs.	
5		Filter Pack #2/16 Sand (RMC Monterey)								
		4" Schedule 40 PVC Riser					CL			5
		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size							Sand content increases w/depth	
10										0
		Bentonite Seal								
15							SP-SM		13 to 20 ft. POORLY GRADED SAND WITH SILT: Dark Grey, Moist, Non-Plastic, 90% Fine Subrounded Sand, 10% Non-Plastic Fines. Slight Organic Odor.	-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-6

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,794.10 Feet (NAD 27)
Date Started: March 1, 2005	Easting: 6,002,194.98 Feet (NAD 27)
Date Completed: March 1, 2005	Ground Surface Elevation: 11.33 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.93 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)					SM		20 to 25 ft. SILTY SAND: Greenish-Grey, Wet, Non-Plastic, 75% Fine Subrounded Sand, 25% Non-Plastic Fines. Slight Organic Odor. Contains some small nodules of clay	-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM		25 to 29 ft. SILTY SAND WITH CLAY: Brownish-Grey, Moist, 55% Fine Subrounded Sand, 30% Non-Plastic Fines, 15% Plastic Fines. Slight Organic Odor.	-15
30							SM		29 to 34 ft. SILTY SAND: Brown, Black and Gold Speckled, Wet, Non-Plastic, 70-85% Fine Subrounded Sand, 15-30% Non-Plastic Fines. Micaceous. No Odor.	-20
35							SP-SM		34 to 38 ft. POORLY GRADED SAND WITH SILT: Brown, Black and Gold Speckled, Wet, Non-Plastic, 90% Fine Subrounded Sand, 10% Non-Plastic Fines. Micaceous. No Odor.	-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-7

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,776.63 Feet (NAD 27)
Date Started: March 1, 2005	Easting: 6,002,234.28 Feet (NAD 27)
Date Completed: March 1, 2005	Ground Surface Elevation: 11.38 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.91 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid							0 to 0.2 ft. 2" ASPHALT	
		Bentonite Seal					SP		0.2 to 1 ft. POORLY GRADED SAND WITH GRAVEL: Light Brown, Moist, Low to Non-Plastic, 70% Medium Rounded Sand, 20% Medium to Coarse Rounded Gravel, 10% Plastic Fines, Trace Non-Plastic Fines. No Odor.	10
		1/2" Schedule 40 PVC Riser					CL		1 to 8 ft. LEAN CLAY with SAND: Reddish Brown, Moist, Low Plasticity, 85% Plastic Fines, 15% Very Fine to Medium Subrounded Sand. No Odor.	
5		Filter Pack #2/16 Sand (RMC Monterey)							clay is interbedded w/silt between 4' and 8' bgs	
		4" Schedule 40 PVC Riser							increasing amount of Silt w/depth	5
		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP		8 to 12 ft. POORLY GRADED SAND: Brown, Moist, Non-Plastic, 95% Fine to Medium Subrounded Sand, 5% Non-Plastic Fines. No Odor.	
10										0
		Bentonite Seal					SM		12 to 29 ft. SILTY SAND: Brown, Wet, Non-Plastic, 70% Fine to medium Subrounded Sand, 30% Non-Plastic Fines. No Odor.	
15										-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-7

(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,776.63 Feet (NAD 27)
Date Started: March 1, 2005	Easting: 6,002,234.28 Feet (NAD 27)
Date Completed: March 1, 2005	Ground Surface Elevation: 11.38 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.91 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)								-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM		decrease in amount of Silt w/depth	-15
30							SM		29 to 35 ft. SILTY SAND: Brown, Black and Gold Speckled, Wet, Non-Plastic, 70-85% Fine Subrounded Sand, 15-30% Non-Plastic Fines, Trace Fine Gravel. Micaceous. No Odor.	-20
35							SP-SM		35 to 38 ft. POORLY GRADED SAND WITH SILT: Brown, Black and Gold Speckled, Wet, Non-Plastic, 90% Fine Subrounded Sand, 10% Non-Plastic Fines. Micaceous. No Odor.	-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-8

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,793.09 Feet (NAD 27)
Date Started: February 28, 2005	Easting: 6,002,285.50 Feet (NAD 27)
Date Completed: February 28, 2005	Ground Surface Elevation: 11.21 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.94 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid							0 to 0.7 ft. 8" CONCRETE	
		Bentonite Seal					AF		0.7 to 1.7 ft. 1' GRAVEL FILL	10
		1/2" Schedule 40 PVC Riser								
5		Filter Pack #2/16 Sand (RMC Monterey)					CL		1.7 to 9 ft. LEAN CLAY with SAND: Dark Brown to Dark Grey, Moist, Low Plasticity, 85% Plastic Fines, 15% Very Fine to Fine Subrounded Sand. Hydrocarbon Staining and Strong Diesel Odor. increase in Sand content between 4' and 5' bgs	5
		4" Schedule 40 PVC Riser								
10		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					CL		9 to 12 ft. LEAN CLAY: Reddisd-Brown to Brown, Moist, Low Plasticity, 90% Plastic Fines, 10% Fine Subrounded Sand. No Odor.	0
		Bentonite Seal								
15							SM		12 to 18 ft. SILTY SAND: Brown, Moist to Wet, Non-Plastic, 80% Fine to Medium Subrounded Sand, 20% Non-Plastic Fines. No Odor.	-5
							SM		18 to 32 ft. SILTY SAND: Brown,Black and Gold Speckled, Wet, Non-Plastic, 70-85% Fine Subrounded Sand, 15-30% Non-Plastic Fines. No Odor.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-8
(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,793.09 Feet (NAD 27)
Date Started: February 28, 2005	Easting: 6,002,285.50 Feet (NAD 27)
Date Completed: February 28, 2005	Ground Surface Elevation: 11.21 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.94 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)								-10
									decrease in non-plastic fines w/depth	
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM			-15
30										-20
									32 to 38 ft. POORLY GRADED SAND WITH SILT: Brown, Black and Gold Speckled, Wet, Non-Plastic, 90% Very Fine to Fine Subrounded Sand, 10% Non-Plastic Fines. No Odor.	
35							SP-SM			-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

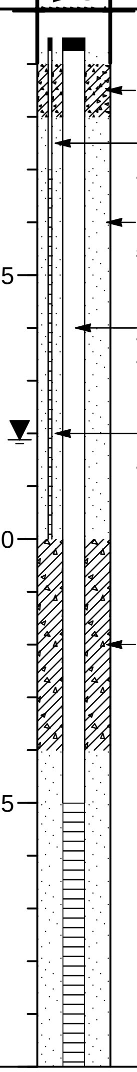
Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-9
(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,812.56 Feet (NAD 27)
Date Started: February 28, 2005	Easting: 6,002,325.33 Feet (NAD 27)
Date Completed: February 28, 2005	Ground Surface Elevation: 10.66 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.29 Feet AMSL (NAVD 29)

Depth (ft. bgs) | Well/Boring Completion | Well/Boring Remarks | Blow Counts | Samples | Sample Number | Sample Time | USCS | Graphic Log | LITHOLOGIC DESCRIPTION | Elevation (ft.)



Well/Boring Remarks:
- 12" Traffic Box w/Lid
- Bentonite Seal
- 1/2" Schedule 40 PVC Riser
- Filter Pack #2/16 Sand (RMC Monterey)
- 4" Schedule 40 PVC Riser
- 1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size
- Bentonite Seal

Depth scale: 5, 10, 15. Elevation scale: 10, 5, 0, -5.

USCS	LITHOLOGIC DESCRIPTION
AF	0 to 3 ft. GRAVEL FILL
GM	3 to 4 ft. SILTY GRAVEL: 50% Coarse Angular Gravel, 40% Non-Plastic Fines, 10% Sand. No Odor.
CL	4 to 9 ft. LEAN CLAY: Brown, Wet, Non-Plastic, 80% Plastic Fines, 10% Non-Plastic Fines, 10% Fine Subrounded Sand. No Odor.
SP-SM	9 to 12 ft. POORLY GRADED SAND WITH SILT: Brown, Wet, Non-Plastic, 90% Fine to Medium Subrounded Sand, 10% Non-Plastic Fines. No Odor.
SM	12 to 38 ft. SILTY SAND: Brown, Wet, Non-Plastic, 60-80% Very Fine to Fine Subrounded Sand, 20-40% Non-Plastic Fines. No Odor. increase in amount of Silt w/depth

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING IW-9

(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,812.56 Feet (NAD 27)
Date Started: February 28, 2005	Easting: 6,002,325.33 Feet (NAD 27)
Date Completed: February 28, 2005	Ground Surface Elevation: 10.66 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.29 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)								-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size								-15
30							SM			-20
35										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-30

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,814.21 Feet (NAD 27)
Date Started: February 28, 2005	Easting: 6,002,294.15 Feet (NAD 27)
Date Completed: February 28, 2005	Ground Surface Elevation: 10.99 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.35 Feet AMSL (NAVD 29)

Well/Boring Remarks (Depth, ft. bgs: 5, 10, 15; Elevation, ft.: 10, 5, 0, -5):

- 12" Traffic Box w/Lid
- Bentonite Seal
- 1/2" Schedule 40 PVC Riser
- Filter Pack #2/16 Sand (RMC Monterey)
- 4" Schedule 40 PVC Riser
- 1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size
- Bentonite Seal

Depth (ft. bgs)	USCS	LITHOLOGIC DESCRIPTION
0 to 1		0 to 1 ft. 1' GRAVEL FILL
1 to 3	GM	1 to 3 ft. SILTY GRAVEL: Brown, Wet, Non-Plastic, 50% Medium Angular Gravel, 30% Non-Plastic Fines, 10% Fine to Medium Angular Sand, Trace Plastic Fines. No odor.
3 to 6	CL	3 to 6 ft. LEAN CLAY with SAND: Dark Brown, Moist, Low Plasticity, 55% Plastic Fines, 30% Fine to Medium Subrounded Sand, 15% Non-Plastic Fines. No Odor.
6 to 8	SM	6 to 8 ft. SILTY SAND with Gravel: Brown, Wet, Non-Plastic, 55% Fine to Medium Subrounded Sand, 30% Non-Plastic Fines, 15% Medium Gravel.
8 to 11	ML	8 to 11 ft. SILT with SAND: Brown, Moist, Non-Plastic, 70% Non-Plastic Fines, 30% Fine Subrounded Sand, Trace Plastic Fines. No Odor.
11 to 32	SM	11 to 32 ft. SILTY SAND: Brown, Wet, Non-Plastic, 60-70% Fine to Medium Subrounded Sand, 30-40% Non-Plastic Fines, Trace Fine Gravel. No Odor.

Columns also present (empty): Blow Counts, Samples, Sample Number, Sample Time, Graphic Log.

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-30

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,814.21 Feet (NAD 27)
Date Started: February 28, 2005	Easting: 6,002,294.15 Feet (NAD 27)
Date Completed: February 28, 2005	Ground Surface Elevation: 10.99 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.35 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)								-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM			-15
30										-20
									32 to 38 ft. POORLY GRADED SAND WITH SILT: Brown, Black and Gold Speckled, Wet to Saturated, Non-Plastic, 90% Fine Subrounded Sand, 10% Non-Plastic Fines. Micaceous. No Odor.	
35							SP-SM			-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-31

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,800.96 Feet (NAD 27)
Date Started: March 3, 2005	Easting: 6,002,310.66 Feet (NAD 27)
Date Completed: March 3, 2005	Ground Surface Elevation: 10.75 Feet AMSL (NAVD 29)
Total Depth: 53.0 Feet bgs	Top of Casing Elevation: 10.57 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid					GP		0 to 2 ft. POORLY GRADED GRAVEL: Grey, Dry, 100% Coarse Angular Gravel. Gravel Fill. No Odor.	10
		Bentonite Seal; 1/2" Schedule 40 PVC Riser					GP-GM		2 to 4 ft. POORLY GRADED GRAVEL WITH SILT: Brown, Wet, Non-Plastic, 80% Medium Subangular Gravel, 10% Fine Subangular Sand, 10% Non-Plastic Fines. Gravel Fill. No Odor.	
5		Filter Pack #2/16 Sand (RMC Monterey)					GM/GC		4 to 7 ft. SILTY GRAVEL / CLAYEY GRAVEL: Brown, Saturated, Non-Plastic, 30% Non-Plastic Fines, 30% Plastic Fines, 25% Medium Gravel, 15% Fine Subrounded Sand.	5
		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM		7 to 9 ft. SILTY SAND: Brown, Moist, Non-Plastic, 55% Fine to Coarse Subrounded Sand, 35% Non-Plastic Fines, 15% Plastic Fines. No Odor.	
10							SP		9 to 17 ft. POORLY GRADED SAND: Brown, Wet, Non-Plastic, 95% Fine to Coarse Subrounded Sand, 5% Non-Plastic Fines. No Odor.	0
15									AS ABOVE: Saturated	-5
							SP-SM		17 to 24 ft. POORLY GRADED SAND WITH SILT: Brown, Wet, Soupy, Non-Plastic, 90% Fine to Medium Subrounded Sand, 10% Non-Plastic Fines. Micaceous. No Odor.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-31

(Sheet 2 of 3)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,800.96 Feet (NAD 27)
Date Started: March 3, 2005	Easting: 6,002,310.66 Feet (NAD 27)
Date Completed: March 3, 2005	Ground Surface Elevation: 10.75 Feet AMSL (NAVD 29)
Total Depth: 53.0 Feet bgs	Top of Casing Elevation: 10.57 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		4" Schedule 40 PVC Riser					SP-SM			-10
25		Bentonite Grout					SM		24 to 34 ft. SILTY SAND: Brown, Wet, Non-Plastic, 70-80% Fine with Trace Medium Subrounded Sand, 20-30% Non-Plastic Fines. Micaceous. No Odor.	-15
30									decrease in Sand content w/depth	-20
35		Bentonite Seal					SP-SM		34 to 41 ft. POORLY GRADED SAND WITH SILT: Brown, Wet, Non-Plastic, 90% Fine with Trace Medium Subrounded Sand, 10% Non-Plastic Fines. Micaceous. No Odor.	-25

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-31

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,800.96 Feet (NAD 27)
Date Started: March 3, 2005	Easting: 6,002,310.66 Feet (NAD 27)
Date Completed: March 3, 2005	Ground Surface Elevation: 10.75 Feet AMSL (NAVD 29)
Total Depth: 53.0 Feet bgs	Top of Casing Elevation: 10.57 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
							SP-SM			-30
45		Filter Pack #2/16 Sand (RMC Monterey)					SP		41 to 50 ft. POORLY GRADED SAND: Brown, Black and Gold Speckled, Wet, Non-Plastic, 95% Fine Subrounded Sand, 5% Non-Plastic Fines. Micaceous. No Odor.	-35
50		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP		50 to 53 ft. POORLY GRADED SAND WITH GRAVEL: Brown, Wet, Non-Plastic, 85% Medium to Coarse Subrounded Sand, 15% Angular Gravel. No Odor.	-40
55									Boring terminated at total depth of 53 feet bgs.	-45

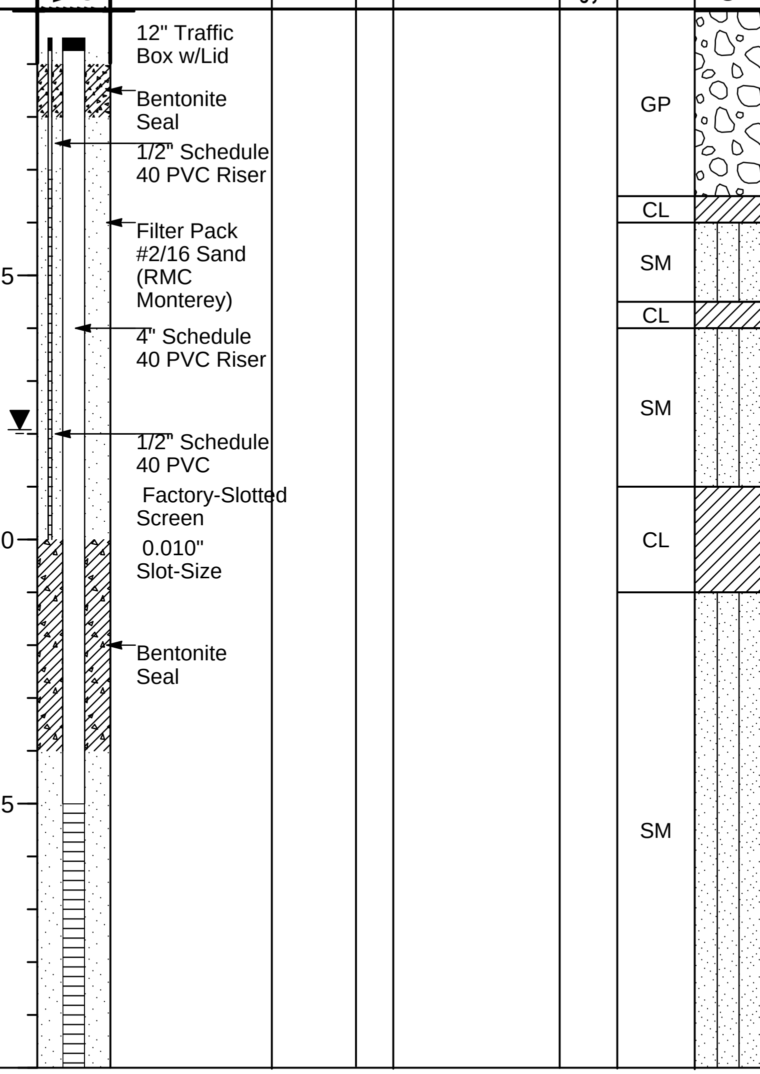
Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TTFW WELL CONSTRUCTION (NO PID) SEAL BEACH.GPJ FSTRW_SA.GDT 10/14/05

TETRA TECH EC, INC.

LOG OF BORING MW-40-32

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,813.40 Feet (NAD 27)
Date Started: February 28, 2005	Easting: 6,002,339.32 Feet (NAD 27)
Date Completed: February 28, 2005	Ground Surface Elevation: 10.48 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.20 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	LITHOLOGIC DESCRIPTION	Elevation (ft.)
	12" Traffic Box w/Lid					GP	0 to 3.5 ft. GRAVEL FILL: 100% Coarse Angular Gravel. No Odor.	10
	Bentonite Seal							
	1/2" Schedule 40 PVC Riser							
						CL	3.5 to 4 ft. Clay Lens.	
	Filter Pack #2/16 Sand (RMC Monterey)					SM	4 to 5.5 ft. SILTY SAND with GRAVEL: Dark Brown, Wet, Non-Plastic, 50% Non-Plastic Fines, 20% Fine Angular Sand, 20% Coarse Angular Gravel, 10% Plastic Fines. No Odor.	
5						CL	5.5 to 6 ft. Clay Lens.	5
	4" Schedule 40 PVC Riser					SM	6 to 9 ft. SILTY SAND - as above	
	1/2" Schedule 40 PVC							
	Factory-Slotted Screen 0.010" Slot-Size					CL	9 to 11 ft. LEAN CLAY: Dark Brown, Moist, Non-Plastic, 75% Non-Plastic Fines, 20% Plastic Fines, 5% Fine Sand. No Odor.	
10								0
	Bentonite Seal					SM	11 to 38 ft. SILTY SAND: Brown, Wet, Non-Plastic, 60-80% Fine to Medium Subrounded Sand, 20-40% Non-Plastic Fines. No Odor.	
15								-5
							Sand becomes more coarse w/depth	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-32

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,813.40 Feet (NAD 27)
Date Started: February 28, 2005	Easting: 6,002,339.32 Feet (NAD 27)
Date Completed: February 28, 2005	Ground Surface Elevation: 10.48 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.20 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)								-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size							As Above	-15
							SM			
30										-20
35										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

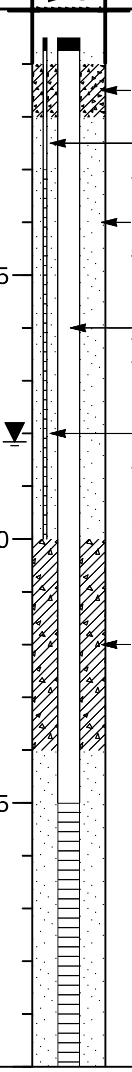
TETRA TECH EC, INC.

LOG OF BORING MW-40-33

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,689.59 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,181.11 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 10.97 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.60 Feet AMSL (NAVD 29)

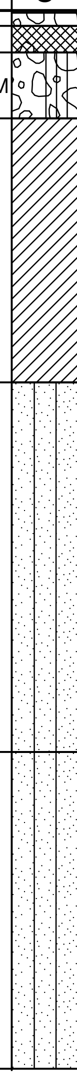
Depth (ft. bgs) | Well/Boring Completion | Well/Boring Remarks | Blow Counts | Samples | Sample Number | Sample Time | USCS | Graphic Log | LITHOLOGIC DESCRIPTION | Elevation (ft.)



Depth marks: 5, 10, 15

Well/Boring Remarks:

- 12" Traffic Box w/Lid
- Bentonite Seal
- 1/2" Schedule 40 PVC Riser
- Filter Pack #2/16 Sand (RMC Monterey)
- 4" Schedule 40 PVC Riser
- 1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size
- Bentonite Seal



USCS	LITHOLOGIC DESCRIPTION
	0 to 0.2 ft. GRAVEL SURFACE
AF	0.2 to 0.7 ft. SAND AND GRAVEL FILL
GP-GM	0.7 to 2 ft. POORLY-GRADED GRAVELwith SAND: Dark Brown, Moist, Non-Plastic, 50% Mediun Subangular Gravel, 40% Fine to Medium Subangular Sand, 10% Non-Plastic Fines.
CL	2 to 7 ft. LEAN CLAY with SAND: Reddish-Brown, Dry to Moist, 60% Plastic Fines, 40% Fine to Medium Subrounded Sand. No Odor.
SM	7 to 14 ft. SILTY SAND: Brown, Wet, Non-Plastic, 70% Fine with Trace Coarse Subrounded Sand, 30% Non-Plastic Fines, Trace Plastic Fines, Trace Fine Angular Gravel. Micaceous. No Odor.
SM	14 to 24 ft. SILTY SAND with CLAY: Brown, Wet, Non-Plastic, 50% Fine Subrounded Sand, 30% Non-Plastic Fines, 20% Plastic Fines Trace Medium Angular Gravel. Micaceous. No Odor.

Elevation marks: 10, 5, 0, -5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-33

(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,689.59 Feet (NAD 27)
Date Started: March 2, 2005	Easting: 6,002,181.11 Feet (NAD 27)
Date Completed: March 2, 2005	Ground Surface Elevation: 10.97 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.60 Feet AMSL (NAVD 29)

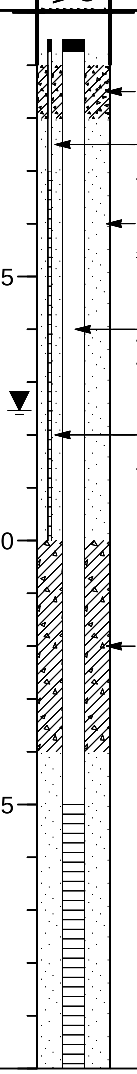
Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)					SM			-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP		24 to 37 ft. POORLY GRADED SAND: Brown, Black and Gold Speckled, Wet, Non-Plastic, 95% Fine Subrounded Sand, 5% Non-Plastic Fines. Micaceous. No Odor.	-15
30										-20
									Silt Lens.	
35										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-34
(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,719.18 Feet (NAD 27)
Date Started: March 1, 2005	Easting: 6,002,233.69 Feet (NAD 27)
Date Completed: March 1, 2005	Ground Surface Elevation: 10.92 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.23 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	LITHOLOGIC DESCRIPTION	Elevation (ft.)
	12" Traffic Box w/Lid						0 to 0.5 ft. GRAVEL FILL: 100% Coarse Angular Gravel.	
	Bentonite Seal					GP-GM	0.5 to 2 ft. POORLY GRADED GRAVEL WITH SILT: Dark Grey, Moist, Non-Plastic, 60% Coarse Angular Gravel, 20% Medium Angular Sand, 20% Non-Plastic Fines. Hydrocarbon Staining and Diesel Odor at 1-2'.	10
	1/2" Schedule 40 PVC Riser					CL	2 to 7 ft. LEAN CLAY with SAND: Reddish Brown, Moist, Low Plasticity, 80% Plastic Fines, 20% Fine to Medium Subrounded Sand. No Odor.	
5	Filter Pack #2/16 Sand (RMC Monterey)							
	4" Schedule 40 PVC Riser							5
	1/2" Schedule 40 PVC					SM	7 to 19 ft. SILTY SAND: Brown to Black, Wet, Low to Non-Plastic, 55-60% Fine to Medium Subrounded Sand, 25-30% Non-Plastic Fines, 10-20% Plastic Fines. Micaceous. No Odor.	
10	Factory-Slotted Screen 0.010" Slot-Size							0
	Bentonite Seal							
15								-5
						ML/CL	19 to 20 ft. Lean Clay/ Silt Lens.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-34
(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,719.18 Feet (NAD 27)
Date Started: March 1, 2005	Easting: 6,002,233.69 Feet (NAD 27)
Date Completed: March 1, 2005	Ground Surface Elevation: 10.92 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.23 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
20–32		Filter Pack #2/16 Sand (RMC Monterey); 4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SM		20 to 32 ft. SILTY SAND: Brown, Black and Gold, Wet, Non-Plastic, 70-85% Fine Subrounded Sand, 15-30% Non-Plastic Fines. Micaceous. No Odor.	-10, -15, -20
32–37							SP-SM		32 to 37 ft. POORLY GRADED SAND WITH SILT: Brown, Black and Gold Speckled, Wet, Non-Plastic, 90% Fine Subrounded Sand, 10% Non-Plastic Fines. Micaceous. No Odor.	-25
37–38							SP		37 to 38 ft. POORLY GRADED SAND: 100% Fine to Medium Subrounded Sand.	
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Depth scale: 25, 30, 35

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-35

(Sheet 1 of 4)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,761.89 Feet (NAD 27)
Date Started: February 23, 2005	Easting: 6,002,239.24 Feet (NAD 27)
Date Completed: February 23, 2005	Ground Surface Elevation: 11.16 Feet AMSL (NAVD 29)
Total Depth: 60.0 Feet bgs	Top of Casing Elevation: 10.78 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
0		12" Traffic Box w/Lid							0 to 0.2 ft. 3" ASPHALT	
									0.2 to 0.7 ft. 6" ARTIFICAIL FILL	10
		Bentonite Seal								
		1/2" Schedule 40 PVC Riser								
		Filter Pack #2/16 Sand (RMC Monterey)					CL		0.7 to 6.5 ft. LEAN CLAY WITH SAND: Brown, Slightly Moist, Medium Plasticity, 75% Plastic Fines, 25% Fine Sand. No Odor.	
5										5
		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP		6.5 to 11 ft. POORLY GRADED SAND: Brown, Wet, Low Plasticity, 90% Fine to Coarse Subrounded Sand, 5% Non-Plastic Fines, 5% Plastic Fines, Trace Fine Gravel. No Odor.	
10										0
							CL		11 to 15 ft. LEAN CLAY WITH SAND: Brown, Wet, Low to Medium Plasticity, 75% Plastic Fines, 25% Fine Sand, Trace Non-Plastic Fines. No Odor.	
15							SM		15 to 20.5 ft. SILTY SAND: Brown, Wet, Non-Plastic, 75% Fine Sand, 25% Non-Plastic Fines, Trace Plastic Fines. No Odor.	-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-35

(Sheet 2 of 4)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,761.89 Feet (NAD 27)
Date Started: February 23, 2005	Easting: 6,002,239.24 Feet (NAD 27)
Date Completed: February 23, 2005	Ground Surface Elevation: 11.16 Feet AMSL (NAVD 29)
Total Depth: 60.0 Feet bgs	Top of Casing Elevation: 10.78 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		4" Schedule 40 PVC Riser					SM			
							CL		20.5 to 22 ft. LEAN CLAY WITH SAND: Dark Brown, Wet, Medium Plasticity, 80% Plastic Fines, 20% Fine Sand, Trace Fine Gravel. No Odor.	-10
							SP		22 to 25 ft. POORLY GRADED SAND: Greyish Brown, Wet, Well Sorted, 100% Fine Well Rounded Sand, Trace Non-Plastic Fines. Micaceous. No Odor.	
25		Bentonite Grout					SM		25 to 55 ft. SILTY SAND: Brown, Wet, Non-Plastic, 70% Fine Rounded Sand, 30% Non-Plastic Fines. No Odor.	-15
30										-20
35										-25

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-35

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,761.89 Feet (NAD 27)
Date Started: February 23, 2005	Easting: 6,002,239.24 Feet (NAD 27)
Date Completed: February 23, 2005	Ground Surface Elevation: 11.16 Feet AMSL (NAVD 29)
Total Depth: 60.0 Feet bgs	Top of Casing Elevation: 10.78 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Bentonite Seal								-30
45										-35
		Filter Pack #2/16 Sand (RMC Monterey)					SM			
50										-40
		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size								
55							SM		55 to 58 ft. SILTY SAND WITH GRAVEL: Brown, Wet, Non-Plastic, 60% Fine to Coarse Rounded Sand, 25% Non-Plastic FInes, 15% Gravel. No Odor.	-45
							CL		58 to 60 ft. SANDY LEAN CLAY: Dark Brown, Moist, Medium Plasticity, 60% Plastic Fines, 40% FIne to Coarse Subangular Sand, Trace Fine Gravel, Trace Non-Plastic Fines. No Odor.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-35

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,761.89 Feet (NAD 27)
Date Started: February 23, 2005	Easting: 6,002,239.24 Feet (NAD 27)
Date Completed: February 23, 2005	Ground Surface Elevation: 11.16 Feet AMSL (NAVD 29)
Total Depth: 60.0 Feet bgs	Top of Casing Elevation: 10.78 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
									Boring terminated at total depth of 60 feet bgs. Additional footage required to compensate for heaving formation conditions.	-50
65										-55
70										-60
75										-65

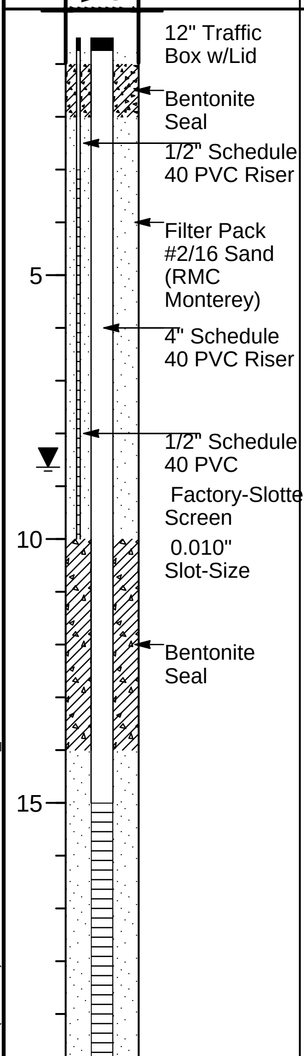
Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-36
(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,770.71 Feet (NAD 27)
Date Started: February 24, 2005	Easting: 6,002,274.76 Feet (NAD 27)
Date Completed: February 24, 2005	Ground Surface Elevation: 11.17 Feet AMSL (NAVD 29)
Total Depth: 36.0 Feet bgs	Top of Casing Elevation: 10.92 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
0		12" Traffic Box w/Lid							0 to 0.2 ft. 3" ASPHALT	
		Bentonite Seal							0.2 to 1.5 ft. POORLY GRADED SAND WITH GRAVEL (ARTIFICIAL FILL): Light Brown, Dry, Non-Plastic, 70% Fine Subrounded Sand, 20% Fine Gravel, 10% Non-Plastic Fines. No odor.	10
		1/2" Schedule 40 PVC Riser					CL		1.5 to 10 ft. SANDY LEAN CLAY: Dark Brown, Moist, Low Plasticity, 50% Plastic Fines, 30% Fine Subrounded Sand, 20% Non-Plastic Fines, Trace Fine Gravel. No Odor.	
5		Filter Pack #2/16 Sand (RMC Monterey)								5
		4" Schedule 40 PVC Riser								
		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size								
10		Bentonite Seal					SP-SM		10 to 15 ft. POORLY GRADED SAND WITH SILT: Brown, Saturated, Low Plasticity, 90% Fine to Medium Rounded to Subrounded Sand, 10% Non-Plastic Fines. NoOodor.	0
15							CL		15 to 20 ft. LEAN CLAY WITH SAND: Dark Brown, Dry to Moist, Low Plasticity, 50% Plastic Fines, 25% Fine to Coarse Rounded Sand, 15% Coarse Gravel, 10% Non-Plastic Fines. No Odor.	-5



Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-36

(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,770.71 Feet (NAD 27)
Date Started: February 24, 2005	Easting: 6,002,274.76 Feet (NAD 27)
Date Completed: February 24, 2005	Ground Surface Elevation: 11.17 Feet AMSL (NAVD 29)
Total Depth: 36.0 Feet bgs	Top of Casing Elevation: 10.92 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)							20 to 36 ft. SANDY SILT: Brown, Saturated, Non-Plastic, 70% Non-Plastic Fines, 30% Fine Rounded Sand, Trace Plastic Fines. No Odor. Heaving.	-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size								-15
							ML			
30										-20
35									AS ABOVE: Micaceous.	
									Boring terminated at total depth of 36 feet bgs. Additional footage required to compensate for heaving formation conditions.	-25

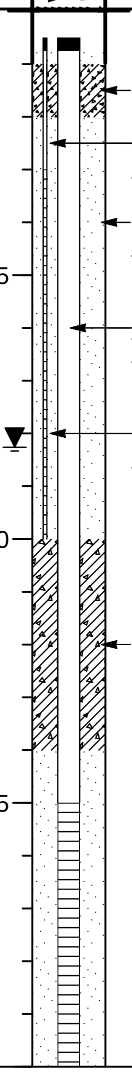
Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TTFW WELL CONSTRUCTION (NO PID) SEAL BEACH.GPJ FSTRW_SA.GDT 10/14/05

TETRA TECH EC, INC.

LOG OF BORING MW-40-37
(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,744.44 Feet (NAD 27)
Date Started: February 25, 2005	Easting: 6,002,331.56 Feet (NAD 27)
Date Completed: February 25, 2005	Ground Surface Elevation: 10.96 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.56 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
0		12" Traffic Box w/Lid							0 to 0.2 ft. 3" ASPHALT	
		Bentonite Seal					SP		0.2 to 1 ft. POORLY GRADED SAND WITH GRAVEL: Yellow-Brown, Dry, Non-Plastic, 80% Medium to Coarse Subrounded Sand, 15% Coarse Gravel, 5% Non-Plastic Fines. No Odor.	10
		1/2" Schedule 40 PVC Riser								
5		Filter Pack #2/16 Sand (RMC Monterey)					CL-ML		1 to 7 ft. LEAN CLAY INTERBEDDED WITH SILT: Dark Brown to Red Brown, Moist, Low Plasticity, 50% Plastic Fines, 40% Non-Plastic Fines, 10% Very Fine Sand. No Odor.	5
		4" Schedule 40 PVC Riser								
		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP-SM		7 to 14 ft. POORLY GRADED SAND WITH SILT: Brown, Wet, Non-Plastic, 90% Medium Subrounded Sand, 10% Non-Plastic Fines. No Odor.	
10										0
		Bentonite Seal								
15							SM		14 to 38 ft. SILTY SAND: Brown, Wet, Non-Plastic, 60-75% Fine to Medium Subrounded Sand, 25-40% Non-Plastic Fines, Trace Plastic Fines. No Odor.	-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TTFW WELL CONSTRUCTION (NO PID) SEAL BEACH.GPJ FSTRW_SA.GDT 10/14/05

TETRA TECH EC, INC.

LOG OF BORING MW-40-37

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,744.44 Feet (NAD 27)
Date Started: February 25, 2005	Easting: 6,002,331.56 Feet (NAD 27)
Date Completed: February 25, 2005	Ground Surface Elevation: 10.96 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.56 Feet AMSL (NAVD 29)

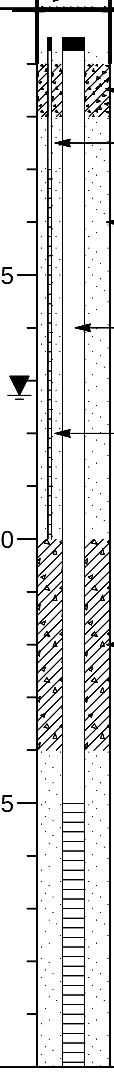
Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)								-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size							As Above	
										-15
							SM			
30										
										-20
35										
										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-38

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,876.09 Feet (NAD 27)
Date Started: March 4, 2005	Easting: 6,002,332.67 Feet (NAD 27)
Date Completed: March 4, 2005	Ground Surface Elevation: 9.98 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 9.62 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid							0 to 0.5 ft. 6" ASPHALT	
		Bentonite Seal					SM		0.5 to 7 ft. SILTY SAND WITH CLAY: Dark Orange Brown, Slightly Moist, Medium Plasicity, 65% Very Fine to Fine Rounded Sand, 20% Non-Plastic Fines, 15% Plastic Fines. No Odor.	
		1/2" Schedule 40 PVC Riser								
5		Filter Pack #2/16 Sand (RMC Monterey)								5
		4" Schedule 40 PVC Riser								
		1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size					SP-SM		7 to 38 ft. POORLY GRADED SAND with SILT: Dark Orange Brown, Slightly Moist, Low to Medium Plasticity, 85% Fine to Medium Round to Subrounded Sand, 10% Non-Plastic Fines, 5% Plastic Fines. No Odor.	
10										0
		Bentonite Seal								
15										-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-38

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,876.09 Feet (NAD 27)
Date Started: March 4, 2005	Easting: 6,002,332.67 Feet (NAD 27)
Date Completed: March 4, 2005	Ground Surface Elevation: 9.98 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 9.62 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)								
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size							As Above	-15
							SP-SM			
30										-20
35										-25
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-39

(Sheet 1 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,641.57 Feet (NAD 27)
Date Started: March 4, 2005	Easting: 6,002,458.92 Feet (NAD 27)
Date Completed: March 4, 2005	Ground Surface Elevation: 10.64 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.40 Feet AMSL (NAVD 29)

Well/Boring Remarks (Depth (ft. bgs), Well/Boring Completion):

- 12" Traffic Box w/Lid
- Bentonite Seal
- 1/2" Schedule 40 PVC Riser
- Filter Pack #2/16 Sand (RMC Monterey)
- 4" Schedule 40 PVC Riser
- 1/2" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size
- Bentonite Seal

Depth scale (ft. bgs): 5, 10, 15. Elevation scale (ft.): 10, 5, 0, -5.

Blow Counts	Samples	Sample Number	Sample Time	USCS	LITHOLOGIC DESCRIPTION
					0 to 0.2 ft. 3" ASPHALT
					0.2 to 2 ft. GRAVEL FILL: 60% Fine to Medium Angular Gravel, 30% Fine to Medium Angular Sand, 10% Non-Plastic Fines. No Odor.
				ML/CL	2 to 4 ft. Interbedded Silt and Clay.
				CL	4 to 12 ft. LEAN CLAY with SAND: Reddish-Brown, Dry to Moist, Low to Non-Plastic, 60% Plastic Fines, 40% Fine to Medium Subrounded Sand. No Odor.
				ML	12 to 13 ft. Silt Lens.
				SM	13 to 18 ft. SILTY SAND: Brown, Wet, Non-Plastic, 70-80% Fine Subrounded Sand, 20-30% Non-Plastic Fines. Micaceous. No Odor.
				ML	18 to 19 ft. Silt Lens.
				SM	19 to 26 ft. SILTY SAND: Brown, Black and Gold, Wet, Non-Plastic, 70% Fine with Trace Medium Subrounded

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING MW-40-39

(Sheet 2 of 2)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,641.57 Feet (NAD 27)
Date Started: March 4, 2005	Easting: 6,002,458.92 Feet (NAD 27)
Date Completed: March 4, 2005	Ground Surface Elevation: 10.64 Feet AMSL (NAVD 29)
Total Depth: 38.0 Feet bgs	Top of Casing Elevation: 10.40 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		Filter Pack #2/16 Sand (RMC Monterey)					SM		Sand, 30% Non-Plastic Fines. Micaceous. No Odor.	-10
25		4" Schedule 40 PVC Factory-Slotted Screen 0.010" Slot-Size								-15
							SP-SM		26 to 30 ft. POORLY-GRADED SAND with SILT: Brown, Black and Gold, Wet, 90% Fine Sand, 10% Non-Plastic Fines, No Odor.	
30							SP		30 to 34 ft. POORLY GRADED SAND: Brown, Black and Gold, Wet, 90-95% Fine Subrounded Sand, 5-10% Non-Plastic Fines. Decreasing Silt with Depth. Micaceous. No Odor.	-20
35							SP		34 to 37 ft. POORLY GRADED SAND: Brown, Black and Gold Speckled, Wet, Non-Plastic, 100% Fine Subrounded Sand, Trace Non-Plastic Fines. Micaceous. No Odor.	-25
							SP		37 to 38 ft. POORLY GRADED SAND: Brown, Wet, 100% Medium to Coarse Subrounded Sand. No Odor.	
									Boring terminated at total depth of 38 feet bgs. Additional footage required to compensate for heaving formation conditions.	

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING VW-40-03
(Sheet 1 of 1)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,779.29 Feet (NAD 27)
Date Started: March 4, 2005	Easting: 6,002,181.82 Feet (NAD 27)
Date Completed: March 4, 2005	Ground Surface Elevation: 11.43 Feet AMSL (NAVD 29)
Total Depth: 12.0 Feet bgs	Top of Casing Elevation: 10.84 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid							0 to 0.2 ft. 3" ASPHALT	
									0.2 to 1 ft. SAND AND GRAVEL FILL	
		Bentonite Seal					ML		1 to 2 ft. SILT: Black, Dry to Moist, Non-Plastic, 90% Non-Plastic Fines, 10% Very Fine Sand. Organic Odor.	10
5		2" Schedule 40 PVC Filter Pack 2/16 Sand (RMC Monterey)					CL		2 to 9 ft. LEAN CLAY with SAND: Brown to Reddish-Brown, Dry to Moist, Low Plasticity, 75% Plastic Fines, 25% Fine to Medium Subrounded Sand. Some Cobbles and Gravels. No Odor.	5
10		2"Schedule 40 PCV Factory Slotted Screen 0.010" Slot Size					SP		9 to 12 ft. POORLY GRADED SAND: Orange Brown, Wet, 100% Fine to Medium Subrounded Sand, Trace Non-Plastic Fines. No Odor.	0
15									Boring terminated at total depth of 12 feet bgs. Additional footage required to compensate for heaving formation conditions.	-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING VW-40-04
(Sheet 1 of 1)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,793.59 Feet (NAD 27)
Date Started: March 3, 2005	Easting: 6,002,401.65 Feet (NAD 27)
Date Completed: March 3, 2005	Ground Surface Elevation: 10.64 Feet AMSL (NAVD 29)
Total Depth: 10.0 Feet bgs	Top of Casing Elevation: 10.47 Feet AMSL (NAVD 29)

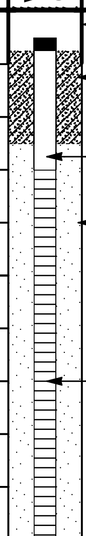
Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
0–1		12" Traffic Box w/Lid; Bentinite Seal					CL		0 to 1 ft. LEAN CLAY: Dark Brown, Moist, Low Plasticity, 80% Plastic Fines, 10% Non-Plastic Fines, 10% Fine Subrounded Sand. Micaceous.	10
1–6		2" Schedule 40 PVC; Filter Pack 2/16 Sand (RMC Monterey)					CL		1 to 6 ft. SANDY LEAN CLAY with GRAVEL: Reddish-Brown, Dry, Low Plasticity, 55% Plastic Fines, 30% Fine to Medium Subrounded Sand, 15% Medium Gravel. No Odor.	5
6–9		2" Schedule 40 PVC Factory Slotted Screen 0.010" Slot Size					ML		6 to 9 ft. SANDY SILT with CLAY: Brown to Dark Brown, Moist, Non-Plastic, 50% Non-Plastic Fines, 30% Very fine to Medium Subrounded Sand, 20% Plastic Fines. No Odor.	
9–10							SP		9 to 10 ft. POORLY GRADED SAND: Brown, Wet, Non-Plastic, 100% Fine to Medium Subrounded Sand, Trace Non-Plastic Fines. No Odor.	
10									Boring terminated at total depth of 10 feet bgs.	0
15										-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING VW-40-05
(Sheet 1 of 1)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: D. Bertolacci	Northing: 2,218,790.12 Feet (NAD 27)
Date Started: March 3, 2005	Easting: 6,002,450.15 Feet (NAD 27)
Date Completed: March 3, 2005	Ground Surface Elevation: 10.86 Feet AMSL (NAVD 29)
Total Depth: 10.0 Feet bgs	Top of Casing Elevation: 10.60 Feet AMSL (NAVD 29)



Depth (ft. bgs)	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	LITHOLOGIC DESCRIPTION	Elevation (ft.)
0–1	12" Traffic Box w/Lid; Bentonite Seal					SM	0 to 1 ft. SILTY SAND: Dark Brown, Dry, Non-Plastic, 70% Fine Subrounded Sand, 30% Non-Plastic Fines. Micaceous.	10
1–4	2" Schedule 40 PVC					CL	1 to 4 ft. SANDY LEAN CLAY: Reddish-Brown, Moist, Low to Non-Plastic, 60% Plastic Fines, 40% Fine to Medium Subrounded Sand. No Odor.	
4–7 (5)	Filter Pack 2/16 Sand (RMC Monterey)					ML/CL	4 to 7 ft. INTERBEDED SILT and CLAY: Brown, Wet, Low to Non-Plastic, 50% Non-Plastic Fines, 40% Plastic Fines, 10% Fine to Medium Subrounded Sand, Trace Medium Gravel. No Odor.	5
7–9	2" Schedule 40 PVC Factory Slotted Screen 0.010" Slot Size					CL	7 to 9 ft. SANDY LEAN CLAY: Dark Brown, Moist, Low Plasticity, 70% Plastic Fines, 30% Medium to Coarse Subrounded Sand. No Odor.	
9–10 (10)						SP-SC	9 to 10 ft. POORLY GRADED SAND WITH CLAY: Dark Brown, Moist to Wet, Low Plasticity, 90% Medium with Trace Coarse Subrounded Sand, 10% Plastic Fines. No Odor.	0
							Boring terminated at total depth of 10 feet bgs.	
15								-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

TETRA TECH EC, INC.

LOG OF BORING VW-40-06
(Sheet 1 of 1)

Client: NFECSW	Drilling Company: Water Development Corp.
Project: Site 40 Enhanced In Situ Bioremediation	Drilling Method: Hollow-Stem Auger
Project Number: 1990.090D	Sampling Method: N/A
Location: Naval Weapons Station, Seal Beach, CA	Borehole Diameter: 12 in.
Geologist: J. Brenner	Northing: 2,218,774.92 Feet (NAD 27)
Date Started: March 4, 2005	Easting: 6,002,332.06 Feet (NAD 27)
Date Completed: March 4, 2005	Ground Surface Elevation: 11.20 Feet AMSL (NAVD 29)
Total Depth: 11.5 Feet bgs	Top of Casing Elevation: 10.65 Feet AMSL (NAVD 29)

Depth (ft. bgs)	Well/Boring Completion	Well/Boring Remarks	Blow Counts	Samples	Sample Number	Sample Time	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	Elevation (ft.)
		12" Traffic Box w/Lid							0 to 0.2 ft. 2" ASPHALT	
		Bentonite Seal							0.2 to 0.7 ft. 6" SAND AND GRAVEL FILL	
		2" Schedule 40 PVC					CL		0.7 to 4 ft. LEAN CLAY: Low Plasticity, 90% Plastic Fines, 10% Fine Subrounded Sand. Hydrocarbon Staining and Diesel Odor at approximatley 1 to 2 feet bgs.	10
5		Filter Pack 2/16 Sand (RMC Monterey)					CL		4 to 9 ft. SANDY LEAN CLAY: Brown to Reddish-Brown, Dry to Moist, Low to Non-Plasticity, 70% Plastic Fines, 30% Fine to Medium Subrounded Sand. No Odor.	5
10		2" Schedule 40 PVC Factory Slotted Screen 0.010" Slot Size					SP-SM		9 to 11.5 ft. POORLY GRADED SAND WITH SILT: Brown, Wet, Non-Plastic, 90% Medium to Coarse Subrounded Sand, 10% Non-Plastic Fines, Trace Medium to Coarse Gravel. No Odor.	0
15									Boring terminated at total depth of11.5 feet bgs.	-5

Notes: Reviewed By: J. Brenner, R.G. 10/4/05
AMSL = above mean sea level
bgs = below ground surface
NA = not applicable

APPENDIX B

SODIUM LACTATE INJECTION VOLUMES BY WELL

APPENDIX B

LIST OF FIGURES

DRAWN BY: MD	CHECKED BY: MT	APPROVED BY: HH	DCN: FWSD-RAC-06-0169	DRAWING NO:
DATE: 11/30/05	REV: REVISION 0		CTO: #0090	060169B1.DWG

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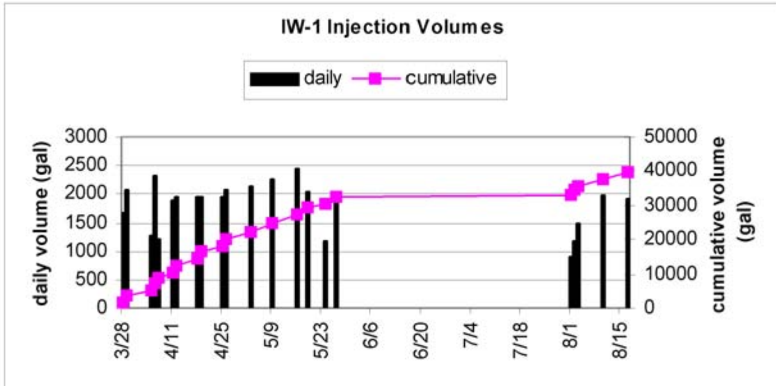

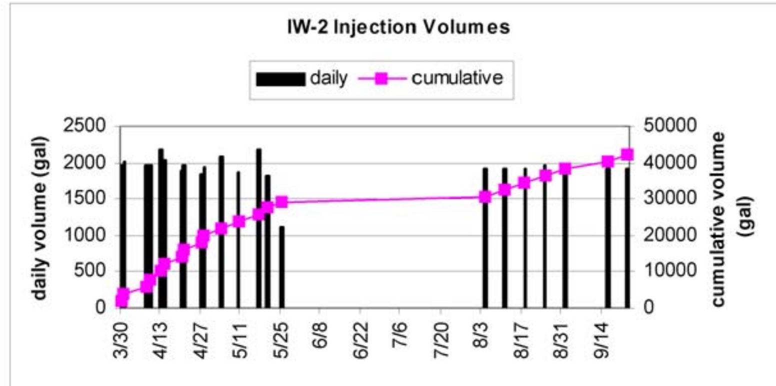

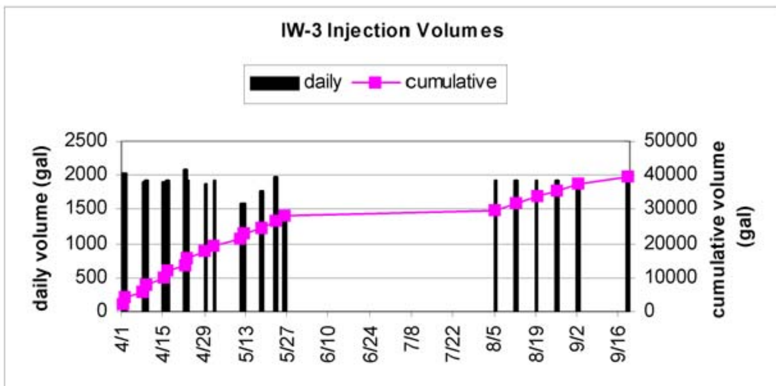

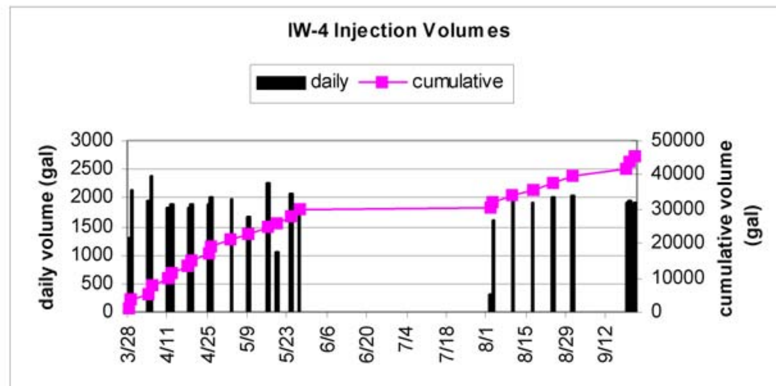

Figure B-1
INJECTION VOLUMES FOR WELLS IW-1 THROUGH IW-4

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWN BY: MD	CHECKED BY: MT	APPROVED BY: HH	DCN: FWSD-RAC-06-0169	DRAWING NO:
DATE: 11/30/05	REV: REVISION 0		CTO: #0090	060169B2.DWG

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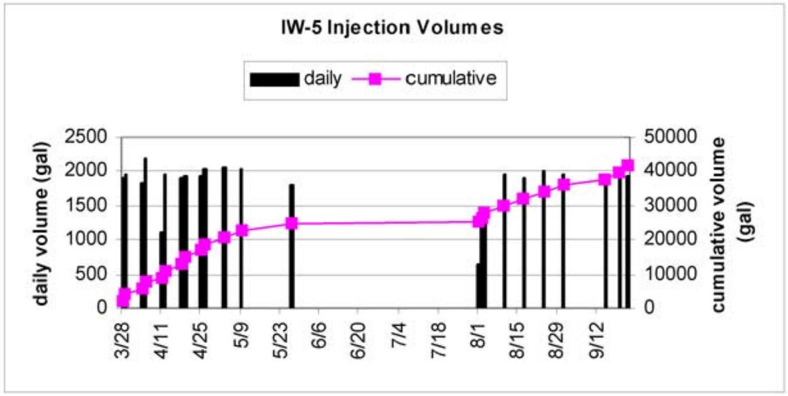

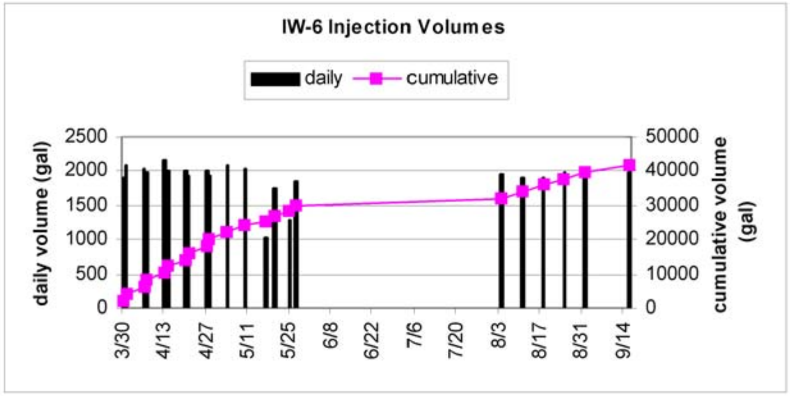

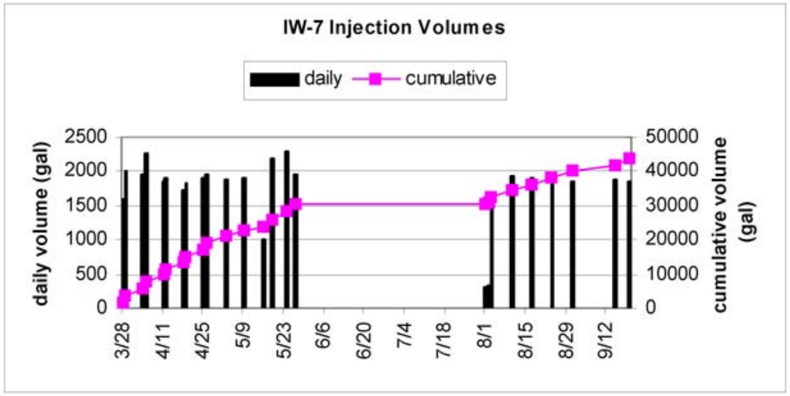

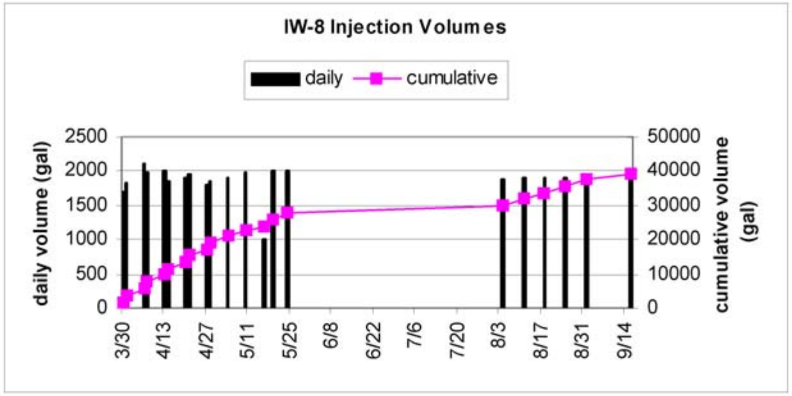

Figure B-2
INJECTION VOLUMES FOR WELLS IW-5 THROUGH IW-8

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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PLOT/UPDATE: NOV 15 2005 12:09:09

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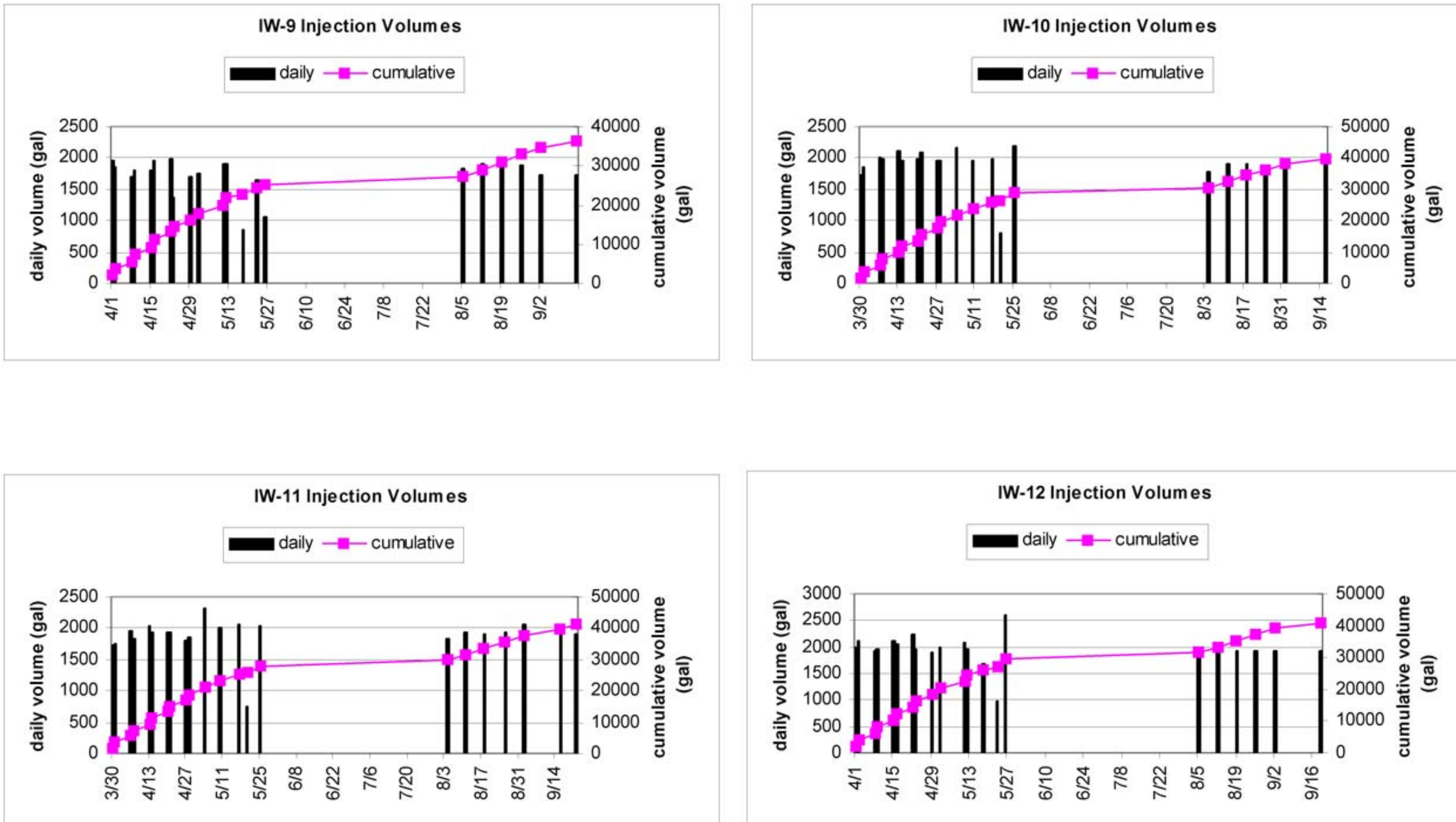

Figure B-3
INJECTION VOLUMES FOR WELLS IW-9 THROUGH IW-12

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWN BY: MD	CHECKED BY: MT	APPROVED BY: HH	DCN: FWSD-RAC-06-0169	DRAWING NO:
DATE: 11/30/09	REV: REVISION 0		CTO: #0090	060169B4.DWG

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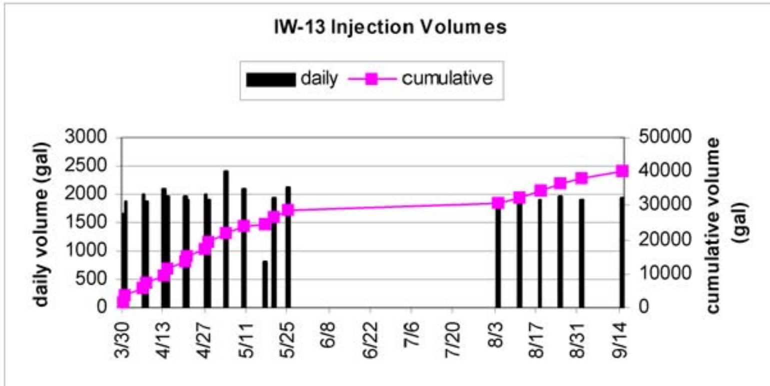

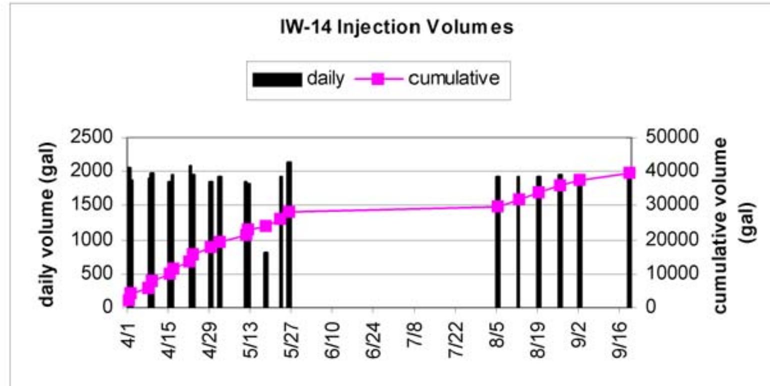

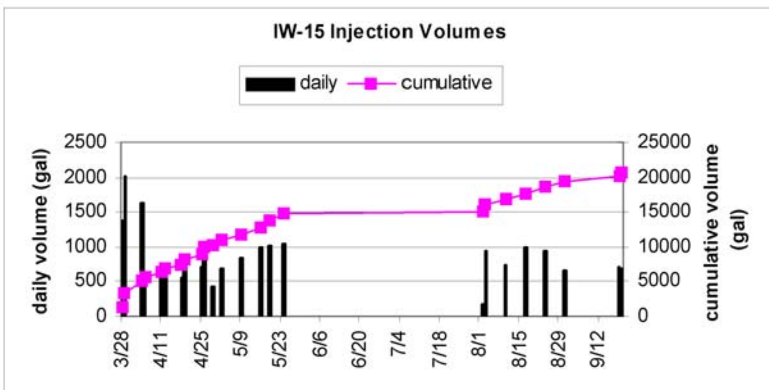

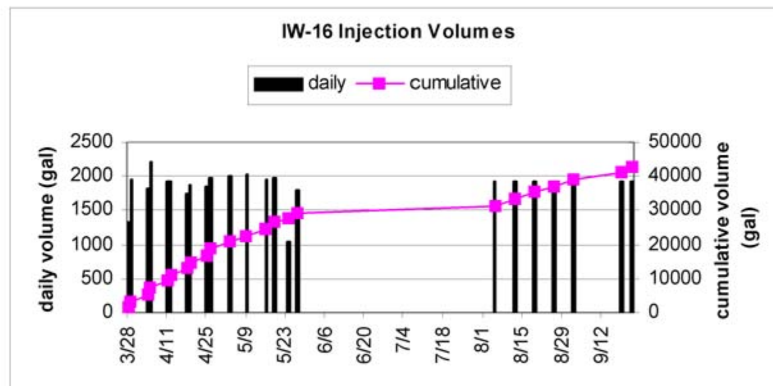

Figure B-4
INJECTION VOLUMES FOR WELLS IW-13 THROUGH IW-16

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWN BY: MD	CHECKED BY: MT	APPROVED BY: HH	DCN: FWSD-RAC-06-0169	DRAWING NO:
DATE: 11/30/05	REV: REVISION 0		CTO: #0090	060169B5.DWG

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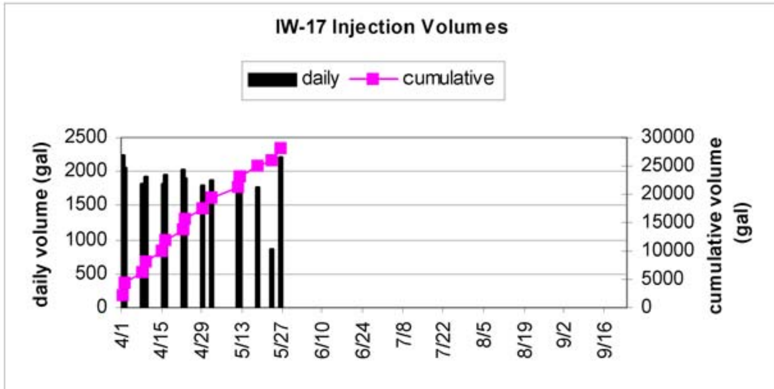


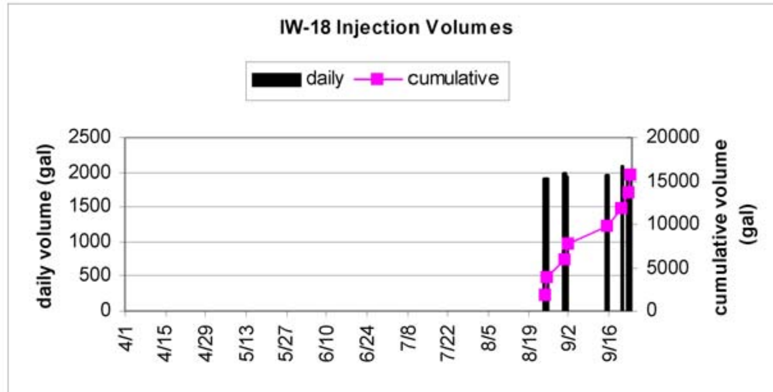


Figure B-5
INJECTION VOLUMES FOR WELLS IW-17 AND IW-18

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

APPENDIX C

PHOTOGRAPHIC LOG OF FIELD ACTIVITIES

Temporary equipment and material staging and storage area near Building 240

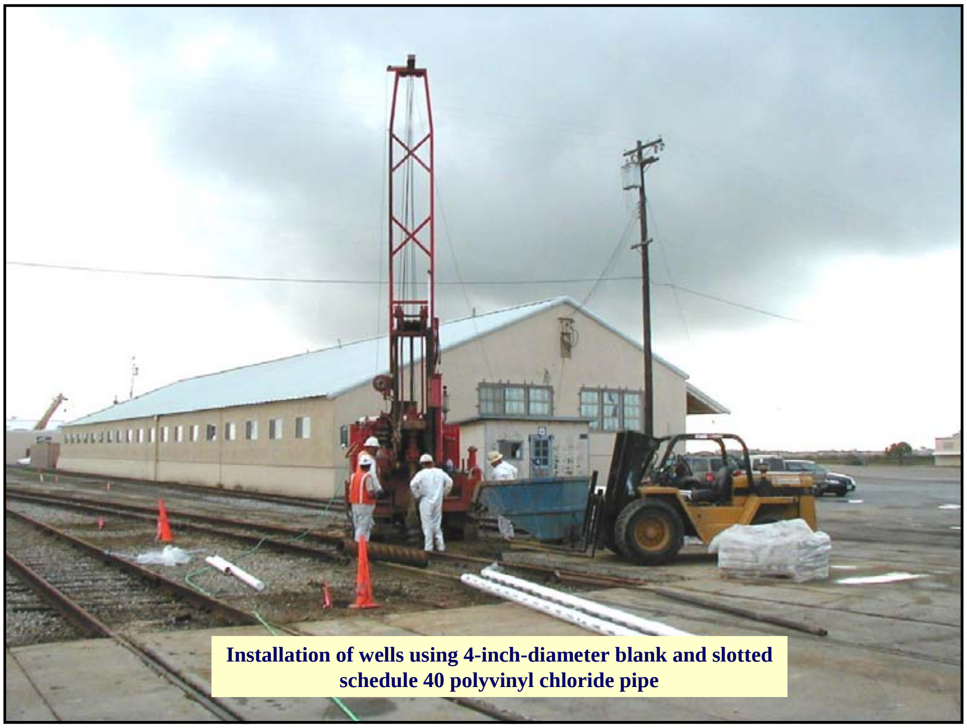
View of the site toward the north and over the railroad tracks

A 24-inch-diameter auger was used for coring the asphalt prior to drilling

Each well location was hand-augered a minimum of 5 feet below ground surface prior to drilling with the drill rig

A drill rig with a 12-inch-diameter hollow-stem auger was used

Drilling injection well IW-9. Drill cuttings were placed in a dumpster temporarily and then hauled and placed in roll-off bins

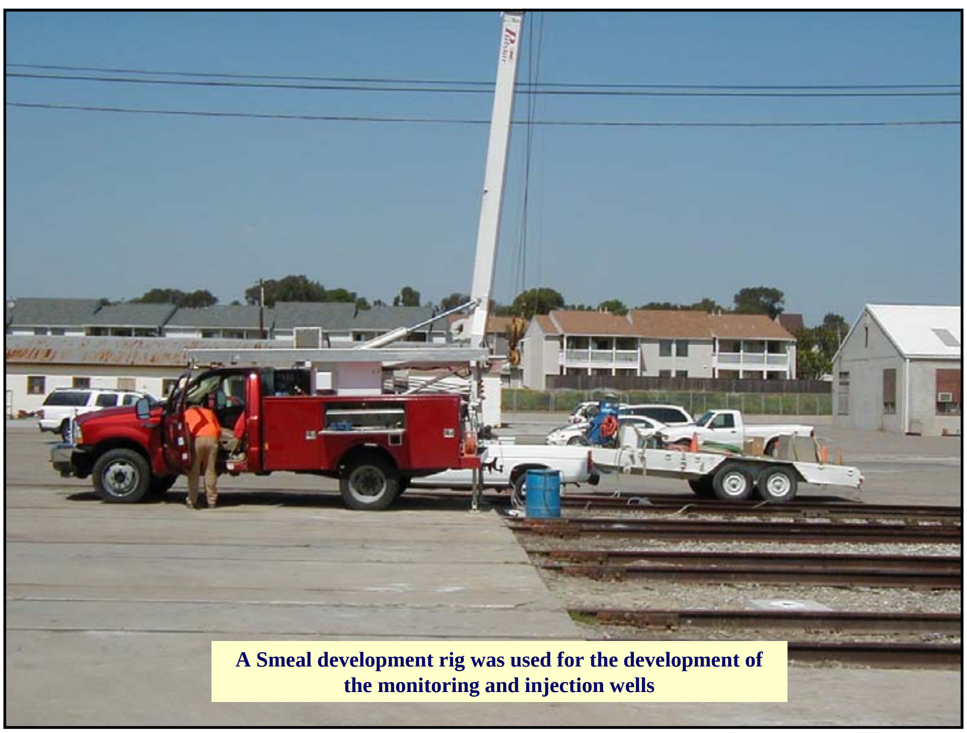

Installation of wells using 4-inch-diameter blank and slotted schedule 40 polyvinyl chloride pipe


Mobilization of drill rig to drill and install IW-19 located underneath an electrical power line

The power was shut down during drilling, installation and development of IW-19

Drilling IW-19 underneath the power line

Well installation activities



A Smeal development rig was used for the development of the monitoring and injection wells

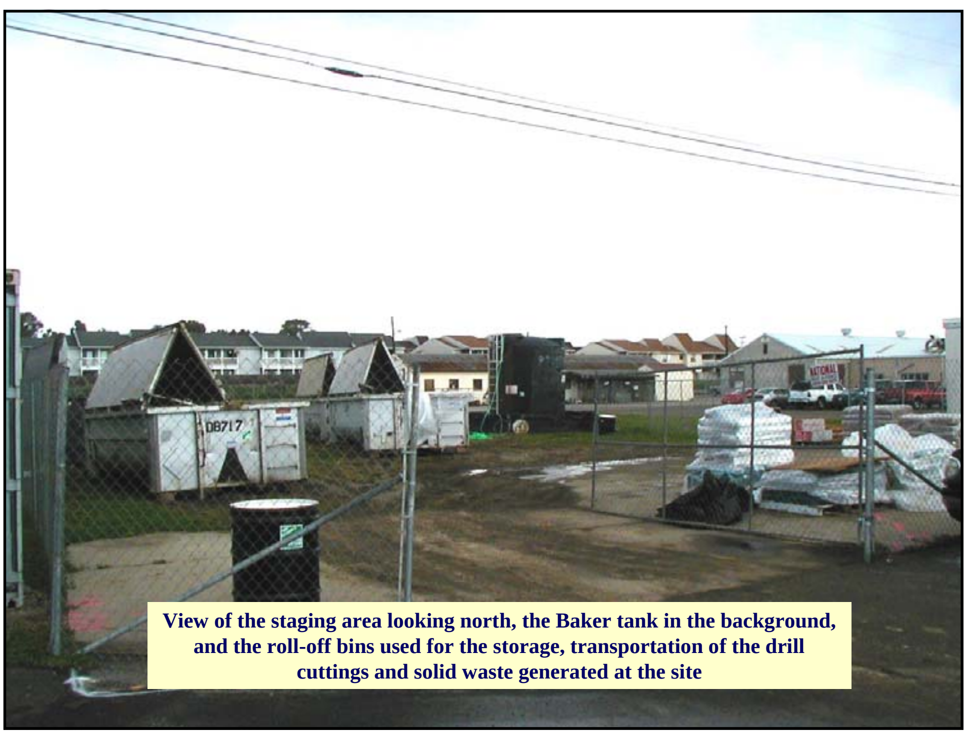
A view of the activities during the installation of IW-19 located underneath a power line

Hollow-stem augers were decontaminated prior to reuse for drilling at other well locations

Steam cleaning was used for decontamination of the equipment and augers

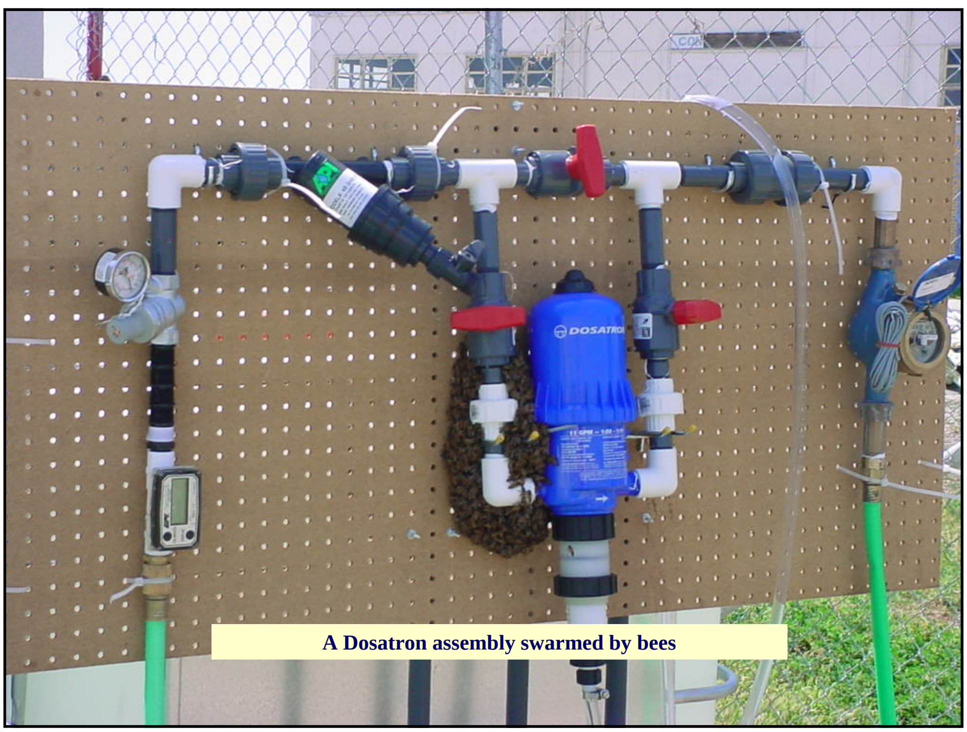
Wastewater from decontamination activities was temporarily stored in 55-gallon steel drums and afterward transferred into a Baker tank

View of drilling and well installation activities at Site 40



View of the staging area looking north, the Baker tank in the background, and the roll-off bins used for the storage, transportation of the drill cuttings and solid waste generated at the site

Dosatron assemblies used for the injection of sodium lactate in the wells



A Dosatron assembly swarmed by bees

Injection of KB-1 in injection well IW-13

Injection of KB-1 in injection well IW-13

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA μg/L

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-038 BAKER TANK 3/28/2005	90-085 HP-1 6/8/2005	90-082 HP-2 6/8/2005	90-083 HP-3 6/8/2005	90-084 HP-4 6/8/2005	90-081 HP-5 6/8/2005	90-127 IW-12 7/6/2005	90-125 IW-13 7/5/2005	90-172 IW-13 8/30/2005	90-123 IW-14 7/5/2005	90-FP-027 IW-15 4/12/2005	90-040 IW-15 4/15/2005	90-040 IW-15 4/15/2005	90-041 IW-15 INJECTOR 4/15/2005	90-FP-060 IW-16 INJECTOR 5/12/2005	90-FP-060B (FD) IW-16 INJECTOR 5/12/2005	90-124 IW-17 7/5/2005	90-158 IW-18 8/23/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	NA	750	1740	1160	2290	1140	1310	1510	NA	1640	NA	NA	NA	NA	NA	NA	1530	1520
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	NA	551	482	274	620	237	263	485	NA	353	NA	NA	NA	NA	NA	NA	77.7	434
NITRATE AS N	mg/L	NA	6.83	5.32	2.18	9.53	2.15	0.1 U	0.1 U	NA	0.1 U	NA	NA	NA	NA	NA	NA	0.1 U	1.49
NITRITE AS N	mg/L	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	0.1 U	NA	NA	NA	NA	NA	NA	0.1 U	0.5 U
SULFATE	mg/L	NA	450	403	218	486	202	19.6	72.7	NA	49.3	NA	NA	NA	NA	NA	NA	0.393 J	250
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	NA	393	341	495	460	343	585	414	NA	585	NA	NA	NA	NA	NA	NA	808	338
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																			
NITRITE AS N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	NA	10 U	10 U	10 U	10 U	10 U	160	49.9	NA	352	NA	8750	8750	NA	NA	NA	422	36
Metals (EPA Method 6010B)	mg/L																		
CALCIUM	mg/L	NA	168 J	174 J	108 J	186 J	86.6 J	29.2	88.7	NA	13.3	NA	NA	NA	NA	NA	NA	5.79	131
IRON	mg/L	NA	2.09	0.917	164	2.03	2.03	1.52	1.55	NA	1.42	NA	NA	NA	NA	NA	NA	3.95	0.154
MAGNESIUM	mg/L	NA	59.3	63.4	91.9	65.8	31.5	8.13	40	NA	7.38	NA	NA	NA	NA	NA	NA	5 U	55.4
POTASSIUM	mg/L	NA	13	8.85	42	13.7	8.5	3.28 J	2.98 J	NA	5 U	NA	NA	NA	NA	NA	NA	5 U	19.9
SODIUM	mg/L	NA	416	374	375	463	295	434	408	NA	559	NA	NA	NA	NA	NA	NA	485	313
ANTIMONY	µg/L	300 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	500 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	66.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	60 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	750 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	400 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	80 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	26.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	7.3 J	9 J	50 U	13 J	NA	NA	NA	NA	NA	NA	9.9 J	7.3 J
BENZENE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U
BROMODICHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	0.38 J
BROMOFORM	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
BROMOMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 UJ	1 U
2-BUTANONE	µg/L	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	7.2 J	15 J	12 J	NA	NA	NA	NA	NA	NA	12 J	50 U
CARBON TETRACHLORIDE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
CHLOROBENZENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
CHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
CHLOROFORM	µg/L	0.63 J	0.28 J	0.36 J	0.82 J	0.23 J	0.7 J	1 U	1 U	0.97 J	1 U	NA	NA	NA	NA	NA	NA	1 U	0.42 J
CHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
DIBROMOCHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	0.57 J

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		**90-038**	**90-085**	**90-082**	**90-083**	**90-084**	**90-081**	**90-127**	**90-125**	**90-172**	**90-123**	**90-FP-027**	**90-040**	**90-040**	**90-041**	**90-FP-060**	**90-FP-060B (FD)**	**90-124**	**90-158**
Sample Location		**BAKER TANK**	**HP-1**	**HP-2**	**HP-3**	**HP-4**	**HP-5**	**IW-12**	**IW-13**	**IW-13**	**IW-14**	**IW-15**	**IW-15**	**IW-15**	**IW-15 INJECTOR**	**IW-16 INJECTOR**	**IW-16 INJECTOR**	**IW-17**	**IW-18**
Sample Date		**3/28/2005**	**6/8/2005**	**6/8/2005**	**6/8/2005**	**6/8/2005**	**6/8/2005**	**7/6/2005**	**7/5/2005**	**8/30/2005**	**7/5/2005**	**4/12/2005**	**4/15/2005**	**4/15/2005**	**4/15/2005**	**5/12/2005**	**5/12/2005**	**7/5/2005**	**8/23/2005**
Analyte	**Units**																		
1,1-DICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
1,2-DICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
1,1-DICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.22 J	0.26 J	0.25 J	NA	NA	NA	NA	NA	NA	1 U	1 U
CIS-1,2-DICHLOROETHENE	µg/L	4.8	1 U	1 U	1 U	1 U	1 U	55	160	280	150	NA	NA	NA	NA	NA	NA	1 U	1.1
TRANS-1,2-DICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.28 J	1.6	1.3	1.5	NA	NA	NA	NA	NA	NA	1 U	1 U
1,2-DICHLOROPROPANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
ETHYLBENZENE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U
2-HEXANONE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA	NA	NA	50 U	50 U
METHYL TERT-BUTYL ETHER	µg/L	0.22 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
4-METHYL-2-PENTANONE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA	NA	NA	50 U	50 U
METHYLENE CHLORIDE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.4	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
STYRENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
TETRACHLOROETHENE	µg/L	38	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6.5	1 U	NA	NA	NA	NA	NA	NA	0.55 J	150
TOLUENE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	21	1	6.1	46	NA	NA	NA	NA	NA	NA	35	0.22 J
1,1,2-TRICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
1,1,1-TRICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U
TRICHLOROETHENE	µg/L	3.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	7.5	1 U	NA	NA	NA	NA	NA	NA	1 U	3.1
VINYL ACETATE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA	NA	NA	50 U	50 U
VINYL CHLORIDE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	11	11	2.3	NA	NA	NA	NA	NA	NA	0.5 U	0.92
XYLENES (TOTAL)	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	0.42 J
SVOCs (EPA Method 8270C)	µg/L																		
ACENAPHTHENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZ[A]ANTHRACENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO[A]PYRENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO[B]FLUORANTHENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO[G,H,I]PERYLENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZOK]FLUORANTHENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-CHLOROETHOXY) METHANE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-CHLOROETHYL) ETHER	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	6.4 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-BROMOPHENYL-PHENYL ETHER	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BUTYL BENZYL PHTHALATE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-CHLORO-3-METHYLPHENOL	µg/L	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-CHLOROANILINE	µg/L	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-CHLORONAPHTHALENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-CHLOROPHENOL	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-CHLOROPHENYL-PHENYL ETHER	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZ[A,H]ANTHRACENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZOFURAN	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-DICHLOROBENZENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-DICHLOROBENZIDINE	µg/L	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DICHLOROPHENOL	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIETHYL PHTHALATE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-038	90-085	90-082	90-083	90-084	90-081	90-127	90-125	90-172	90-123	90-FP-027	90-040	90-040	90-041	90-FP-060	90-FP-060B (FD)	90-124	90-158
Sample Location		BAKER TANK	HP-1	HP-2	HP-3	HP-4	HP-5	IW-12	IW-13	IW-13	IW-14	IW-15	IW-15	IW-15	IW-15 INJECTOR	IW-16 INJECTOR	IW-16 INJECTOR	IW-17	IW-18
Sample Date		3/28/2005	6/8/2005	6/8/2005	6/8/2005	6/8/2005	6/8/2005	7/6/2005	7/5/2005	8/30/2005	7/5/2005	4/12/2005	4/15/2005	4/15/2005	4/15/2005	5/12/2005	5/12/2005	7/5/2005	8/23/2005
Analyte	**Units**																		
DIMETHYL PHTHALATE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DIMETHYLPHENOL	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DI-N-BUTYL PHTHALATE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-DINITRO-2-METHYLPHENOL	µg/L	47 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DINITROPHENOL	µg/L	47 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DINITROTOLUENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-DINITROTOLUENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DI-N-OCTYL PHTHALATE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROBENZENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROBUTADIENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROCYCLOPENTADIENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROETHANE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
INDENO[1,2,3-CD]PYRENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLPHENOL	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-METHYLPHENOL	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-NITROANILINE	µg/L	47 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-NITROANILINE	µg/L	47 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-NITROANILINE	µg/L	47 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITROBENZENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-NITROPHENOL	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-NITROPHENOL	µg/L	47 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-NITROSO-DI-N-PROPYLAMINE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-NITROSODIPHENYLAMINE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PENTACHLOROPHENOL	µg/L	47 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENOL	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PYRENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-TRICHLOROBENZENE	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-TRICHLOROPHENOL	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-TRICHLOROPHENOL	µg/L	9.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	NA	1.66	2.35	2.22	1.73	3.91	57	7.06	NA	113	NA	NA	NA	NA	NA	NA	241	2.94
CHLORIDE-CL	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	NA	24.58	24.17	24.85	24.16	23.86	22.34	23.53	24.37	23.56	NA	21.63	NA	NA	NA	NA	22.63	23.72
ALKALINITY	mg/L	NA	286	320	260	244	298	554	270	NA	262	NA	NA	NA	NA	NA	NA	765	280
CHEMICAL OXYGEN DEMAND	mg/L	NA	7	0	0	0	0	1224	0	NA	54	816	8856	NA	9000	13104	14221	332	0
DISSOLVED OXYGEN	mg/L	NA	0.4	0.3	0.39	0.39	0.38	0.48	0.48	0.21	0.25	NA	0.31	NA	NA	NA	NA	0.3	0.37
IRON	mg/L	NA	0	0	0.4	0	0.2	0.9	0	NA	0.7	NA	NA	NA	NA	NA	NA	1.6	0
NITRATE	mg/L	NA	0.3	1.3	0	0	0	2.6	5.8	NA	1.4	NA	NA	NA	NA	NA	NA	2.2	0.7
SULFATE	mg/L	NA	200	200	200	200	200	50	73	NA	73	NA	NA	NA	NA	NA	NA	50	200
OXIDATION REDUCTION POTENTIAL	MV	NA	170	201	185	177	210	-87	-264	60	-11	NA	-510	NA	NA	NA	NA	66	121
DISSOLVED HYDROGEN	nM	NA	NA	NA	NA	NA	NA	1.6	1.5	NA	6.8	NA	NA	NA	NA	NA	NA	4.8	NA
PH	PH_UNITS	NA	7.48	7.22	7.38	7.44	7.72	6.44	6.56	6.24	6.42	NA	6.36	NA	NA	NA	NA	6.33	6.93
CARBON DIOXIDE	ppm	NA	18	16.5	14	18	15.5	50	25	NA	35	NA	NA	NA	NA	NA	NA	40	25
SPECIFIC CONDUCTIVITY	µmhos/cm	NA	2530	2360	1690	2760	1510	1560	2190	3850	2110	NA	7860	NA	NA	NA	NA	1570	2200
HYDROGEN SULFIDE	µg/L	NA	NA	NA	NA	NA	NA	1850	6570	NA	246	NA	NA	NA	NA	NA	NA	0.42 U	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-038	90-085	90-082	90-083	90-084	90-081	90-127	90-125	90-172	90-123	90-FP-027	90-040	90-040	90-041	90-FP-060	90-FP-060B (FD)	90-124	90-158
Sample Location		BAKER TANK	HP-1	HP-2	HP-3	HP-4	HP-5	IW-12	IW-13	IW-13	IW-14	IW-15	IW-15	IW-15	IW-15 INJECTOR	IW-16 INJECTOR	IW-16 INJECTOR	IW-17	IW-18
Sample Date		3/28/2005	6/8/2005	6/8/2005	6/8/2005	6/8/2005	6/8/2005	7/6/2005	7/5/2005	8/30/2005	7/5/2005	4/12/2005	4/15/2005	4/15/2005	4/15/2005	5/12/2005	5/12/2005	7/5/2005	8/23/2005
Analyte	**Units**																		
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	NA	21000	37000	37000	33000	29000	190000	85000	430000	150000	NA	NA	NA	NA	NA	NA	160000	73000
ETHANE	µg/L	NA	4.4	2.3	3.2	3.2	2.1	1.3 U	1.3 U	1.3 U	1.3 U	NA	NA	NA	NA	NA	NA	0.87 J	1.3 U
ETHENE	µg/L	NA	4	2.2	2.6	2.7	2	1.2 J	2.2	3.7	1.9	NA	NA	NA	NA	NA	NA	0.63 J	2.1
METHANE	µg/L	NA	8.1	5.7	5.4	6.4	4.8	5300	1100	1300	2100	NA	NA	NA	NA	NA	NA	3500	7500

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-039 IW-5 4/11/2005	90-129 IW-6 7/6/2005	90-170 IW-6 8/30/2005	90-128 IW-7 7/6/2005	90-FP-034 IW-7 INJECTOR 4/15/2005	90-FP-038 IW-7 INJECTOR 5/4/2005	90-FP-038B (FD) IW-7 INJECTOR 5/4/2005	90-FP-054 IW-7 INJECTOR 5/10/2005	90-FP-054B (FD) IW-7 INJECTOR 5/10/2005	90-FP-061 IW-7 INJECTOR 5/24/2005	90-FP-061B (FD) IW-7 INJECTOR 5/24/2005	90-FP-062 IW-7 INJECTOR 5/25/2005	90-FP-062B (FD) IW-7 INJECTOR 5/25/2005	90-FP-063 IW-7 INJECTOR 5/26/2005	90-FP-063B (FD) IW-7 INJECTOR 5/26/2005	90-122 IW-8 7/5/2005	90-171 IW-8 8/30/2005	90-120 IW-9 7/5/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	NA	1740	NA	1180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6330	NA	7460
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	NA	115	NA	174	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	148	NA	66.3
NITRATE AS N	mg/L	NA	0.1 U	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1 U	NA	0.1 U
NITRITE AS N	mg/L	NA	0.1 U	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1 U	NA	0.1 U
SULFATE	mg/L	NA	8.93	NA	92.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	NA	0.38 J
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	NA	986	NA	520	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2770	NA	3490
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																			
NITRITE AS N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	NA	319	NA	148	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	375	NA	2350
Metals (EPA Method 6010B)	mg/L																		
CALCIUM	mg/L	NA	47.4	NA	23.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	42.7	NA	43.5
IRON	mg/L	NA	2.32	NA	0.36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	19.9	NA	27
MAGNESIUM	mg/L	NA	19	NA	10.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20.7	NA	12.1
POTASSIUM	mg/L	NA	5 U	NA	5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.48 J	NA	2.99 J
SODIUM	mg/L	NA	484	NA	377	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1650	NA	1830
ANTIMONY	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	NA	67 J	50 U	7.4 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	29 J	50 U	81 J
BENZENE	µg/L	NA	0.29 J	0.5 U	0.22 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
BROMOFORM	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
BROMOMETHANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
2-BUTANONE	µg/L	NA	52 J	19 J	50 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 J	17 J	130 J
CARBON TETRACHLORIDE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
CHLOROBENZENE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
CHLOROETHANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
CHLOROFORM	µg/L	NA	0.32 J	3.1	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	9.9	1 U
CHLOROMETHANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-039	90-129	90-170	90-128	90-FP-034	90-FP-038	90-FP-038B (FD)	90-FP-054	90-FP-054B (FD)	90-FP-061	90-FP-061B (FD)	90-FP-062	90-FP-062B (FD)	90-FP-063	90-FP-063B (FD)	90-122	90-171	90-120
Sample Location		IW-5	IW-6	IW-6	IW-7	IW-7 INJECTOR	IW-7 INJECTOR	IW-7 INJECTOR	IW-7 INJECTOR	IW-7 INJECTOR	IW-7 INJECTOR	IW-7 INJECTOR	IW-7 INJECTOR	IW-7 INJECTOR	IW-7 INJECTOR	IW-7 INJECTOR	IW-8	IW-8	IW-9
Sample Date		4/11/2005	7/6/2005	8/30/2005	7/6/2005	4/15/2005	5/4/2005	5/4/2005	5/10/2005	5/10/2005	5/24/2005	5/24/2005	5/25/2005	5/25/2005	5/26/2005	5/26/2005	7/5/2005	8/30/2005	7/5/2005
Analyte	Units																		
1,1-DICHLOROETHANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
1,2-DICHLOROETHANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
1,1-DICHLOROETHENE	µg/L	NA	0.88 J	1 U	0.59 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
CIS-1,2-DICHLOROETHENE	µg/L	NA	560	270	520	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97	11	43
TRANS-1,2-DICHLOROETHENE	µg/L	NA	4.2	1.2	3.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.48 J	1 U	0.3 J
1,2-DICHLOROPROPANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
ETHYLBENZENE	µg/L	NA	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U
2-HEXANONE	µg/L	NA	50 U	50 U	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	50 U	50 U
METHYL TERT-BUTYL ETHER	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
4-METHYL-2-PENTANONE	µg/L	NA	50 U	50 U	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	50 U	50 U
METHYLENE CHLORIDE	µg/L	NA	1 U	1.6	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.6	3.6	2.2
STYRENE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
TETRACHLOROETHENE	µg/L	NA	2	29	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.25 J	0.3 J	0.68 J
TOLUENE	µg/L	NA	3.8	0.7	1.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20	250	10
1,1,2-TRICHLOROETHANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
1,1,1-TRICHLOROETHANE	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U
TRICHLOROETHENE	µg/L	NA	2.8	31	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.25 J	0.22 J	0.71 J
VINYL ACETATE	µg/L	NA	50 U	50 U	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	50 U	50 U
VINYL CHLORIDE	µg/L	NA	20	6.1	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.26 J	0.48 J	7.1
XYLENES (TOTAL)	µg/L	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.21 J	1 U	0.28 J
SVOCs (EPA Method 8270C)	µg/L																		
ACENAPHTHENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZ[A]ANTHRACENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO[A]PYRENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO[B]FLUORANTHENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO[G,H,I]PERYLENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZOK]FLUORANTHENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-CHLOROETHOXY) METHANE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-CHLOROETHYL) ETHER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-BROMOPHENYL-PHENYL ETHER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BUTYL BENZYL PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-CHLORO-3-METHYLPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-CHLOROANILINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-CHLORONAPHTHALENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-CHLOROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-CHLOROPHENYL-PHENYL ETHER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZ[A,H]ANTHRACENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZOFURAN	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-DICHLOROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-DICHLOROBENZIDINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DICHLOROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIETHYL PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-039	90-129	90-170	90-128	90-FP-034	90-FP-038	90-FP-038B (FD)	90-FP-054	90-FP-054B (FD)	90-FP-061	90-FP-061B (FD)	90-FP-062	90-FP-062B (FD)	90-FP-063	90-FP-063B (FD)	90-122	90-171	90-120
Sample Location		**IW-5**	**IW-6**	**IW-6**	**IW-7**	**IW-7 INJECTOR**	**IW-7 INJECTOR**	**IW-7 INJECTOR**	**IW-7 INJECTOR**	**IW-7 INJECTOR**	**IW-7 INJECTOR**	**IW-7 INJECTOR**	**IW-7 INJECTOR**	**IW-7 INJECTOR**	**IW-7 INJECTOR**	**IW-7 INJECTOR**	**IW-8**	**IW-8**	**IW-9**
Sample Date		**4/11/2005**	**7/6/2005**	**8/30/2005**	**7/6/2005**	**4/15/2005**	**5/4/2005**	**5/4/2005**	**5/10/2005**	**5/10/2005**	**5/24/2005**	**5/24/2005**	**5/25/2005**	**5/25/2005**	**5/26/2005**	**5/26/2005**	**7/5/2005**	**8/30/2005**	**7/5/2005**
Analyte	**Units**																		
DIMETHYL PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DIMETHYLPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DI-N-BUTYL PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-DINITRO-2-METHYLPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DINITROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DINITROTOLUENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-DINITROTOLUENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DI-N-OCTYL PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROBUTADIENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROCYCLOPENTADIENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROETHANE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
INDENO[1,2,3-CD]PYRENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-METHYLPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-NITROANILINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-NITROANILINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-NITROANILINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-NITROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-NITROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-NITROSO-DI-N-PROPYLAMINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-NITROSODIPHENYLAMINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PENTACHLOROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PYRENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-TRICHLOROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-TRICHLOROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-TRICHLOROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	NA	153	NA	44.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1490	NA	1880
CHLORIDE-CL	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	22.11	22.08	24.04	22.36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22.16	24.55	20.96
ALKALINITY	mg/L	1550	887	NA	4.74	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1750	NA	1450
CHEMICAL OXYGEN DEMAND	mg/L	825	45	NA	27	9000	12528	13320	11250	18000	18000	18000	18000	18000	18000	18000	1728	NA	2916
DISSOLVED OXYGEN	mg/L	0.19	0.55	0.2	0.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.29	0.17	0.44
IRON	mg/L	4.4	0.3	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.2	NA	7.6
NITRATE	mg/L	27.6	15	NA	7.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17	NA	17.8
SULFATE	mg/L	50	50	NA	175	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50	NA	50
OXIDATION REDUCTION POTENTIAL	MV	-539	-256	39	-227	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	55	87	62
DISSOLVED HYDROGEN	nM	NA	410	NA	180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11	NA	6.7
PH	PH_UNITS	6.15	6.35	6.14	6.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.1	6.3	6.13
CARBON DIOXIDE	ppm	300	100	NA	37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	150	NA	300
SPECIFIC CONDUCTIVITY	µmhos/cm	15900	1950	4100	1478	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4950	11360	5380
HYDROGEN SULFIDE	µg/L	NA	18500	NA	6910	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.25	NA	1.41

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-039 IW-5 4/11/2005	90-129 IW-6 7/6/2005	90-170 IW-6 8/30/2005	90-128 IW-7 7/6/2005	90-FP-034 IW-7 INJECTOR 4/15/2005	90-FP-038 IW-7 INJECTOR 5/4/2005	90-FP-038B (FD) IW-7 INJECTOR 5/4/2005	90-FP-054 IW-7 INJECTOR 5/10/2005	90-FP-054B (FD) IW-7 INJECTOR 5/10/2005	90-FP-061 IW-7 INJECTOR 5/24/2005	90-FP-061B (FD) IW-7 INJECTOR 5/24/2005	90-FP-062 IW-7 INJECTOR 5/25/2005	90-FP-062B (FD) IW-7 INJECTOR 5/25/2005	90-FP-063 IW-7 INJECTOR 5/26/2005	90-FP-063B (FD) IW-7 INJECTOR 5/26/2005	90-122 IW-8 7/5/2005	90-171 IW-8 8/30/2005	90-120 IW-9 7/5/2005
Analyte	**Units**																		
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	NA	280000	580000	100000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	730000	770000	770000
ETHANE	µg/L	NA	1.3 U	1.3 U	1.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.3 U	1.3 U	1.3 U
ETHENE	µg/L	NA	15	0.67 J	1 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.3	1.2 U	4.1
METHANE	µg/L	NA	6400	3900	160	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	530	580	4700

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number **Sample Location** **Sample Date**		**90-121 (FD)** **IW-9** **7/5/2005**	**90-FP-024** **LACTATE SOLUTION** **4/11/2005**	**90-026** **MW-40-01** **3/25/2005**	**90-111** **MW-40-01** **6/30/2005**	**90-205** **MW-40-01** **9/30/2005**	**90-205** **MW-40-01** **9/30/2005**	**90-027** **MW-40-02** **3/25/2005**	**90-FP-033** **MW-40-02** **4/12/2005**	**90-058** **MW-40-02** **4/27/2005**	**90-FP-059** **MW-40-02** **5/12/2005**	**90-075** **MW-40-02** **5/26/2005**	**90-FP-074** **MW-40-02** **6/9/2005**	**90-112** **MW-40-02** **6/30/2005**	**90-FP-090** **MW-40-02** **7/14/2005**	**90-145** **MW-40-02** **7/29/2005**	**90-FP-102** **MW-40-02** **8/10/2005**
Analyte	**Units**																
Residue, Filterable (EPA Method 160.1)																	
TDS	mg/L	NA	NA	645	650	785	NA	735	NA	695	NA	760	NA	760	NA	785	NA
Ion Chromatography (EPA Method 300.0)																	
CHLORIDE	mg/L	NA	NA	NA	55.4	144	NA	NA	NA	92.7	NA	106	NA	110	NA	140	NA
NITRATE AS N	mg/L	NA	NA	NA	2.81 J	3.1	NA	NA	NA	5.37	NA	3.33	NA	4.11 J	NA	3.79	NA
NITRITE AS N	mg/L	NA	NA	NA	0.1 U	0.1 U	NA	NA	NA	0.1 U	NA	0.1 U	NA	0.1 U	NA	0.1 U	NA
SULFATE	mg/L	NA	NA	NA	44.7	65.8	NA	NA	NA	76.4	NA	73.1	NA	75.2	NA	75.5	NA
Total Alkalinity (EPA Method 310.1)																	
ALKALINITY	mg/L	NA	NA	398	381	289	NA	383	NA	391	NA	341	NA	363	NA	292	NA
Nitrogen as Nitrate (EPA Method 353.3)																	
NITRATE-N	mg/L	NA	NA	2.15	NA	NA	NA	4.72	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																	
NITRITE AS N	mg/L	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	26	NA	NA	NA	72.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	NA	NA	10 U	10 U	10.4	10.4	10 U	NA	23.7	NA	11.8	NA	34.7	NA	10 U	NA
Metals (EPA Method 6010B)	mg/L																
CALCIUM	mg/L	NA	NA	19.2	26.8	53.9	NA	54	NA	59.5	NA	60.7	NA	59.8	NA	61.6	NA
IRON	mg/L	NA	NA	0.0712 J	0.0487 J	0.1 U	NA	0.776	NA	4.05	NA	0.0558 J	NA	0.0728 J	NA	0.129	NA
MAGNESIUM	mg/L	NA	NA	7.73	10.5	18.5	NA	20.5	NA	23	NA	22.1	NA	21.9	NA	22.4	NA
POTASSIUM	mg/L	NA	NA	5 U	5 U	5 U	NA	5 U	NA	2.32 J	NA	2.68 J	NA	2.06 J	NA	5 U	NA
SODIUM	mg/L	NA	NA	196 J	179	198	NA	181 J	NA	182	NA	170	NA	171	NA	175	NA
ANTIMONY	µg/L	NA	NA	300 U	NA	NA	NA	300 U	NA	300 U	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	500 U	NA	NA	NA	500 U	NA	500 U	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	17.6 J	NA	NA	NA	41.5	NA	81.5	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	3 U	NA	NA	NA	3 U	NA	3 U	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	40 U	NA	NA	NA	40 U	NA	40 U	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	70 U	NA	NA	NA	70 U	NA	70 U	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	70 U	NA	NA	NA	70 U	NA	70 U	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	60 U	NA	NA	NA	60 U	NA	60 U	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	40 U	NA	NA	NA	40 U	NA	40 U	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	50 U	NA	NA	NA	50 U	NA	50 U	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	50 U	NA	NA	NA	50 U	NA	50 U	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	750 U	NA	NA	NA	750 U	NA	750 U	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	70 U	NA	NA	NA	70 U	NA	70 U	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	400 U	NA	NA	NA	400 U	NA	400 U	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	28.6 J	NA	NA	NA	13.1 J	NA	15.3 J	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	20 U	NA	NA	NA	11.7 J	NA	30	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																	
MERCURY	µg/L	NA	NA	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																	
ACETONE	µg/L	89 J	NA	50 UJ	50 UJ	50 U	NA	50 UJ	NA	50 UJ	NA	50 UJ	NA	50 UJ	NA	50 U	NA
BENZENE	µg/L	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
BROMODICHLOROMETHANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
BROMOFORM	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
BROMOMETHANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
2-BUTANONE	µg/L	140 J	NA	50 UJ	50 UJ	50 U	NA	50 UJ	NA	50 U	NA	50 U	NA	50 UJ	NA	50 U	NA
CARBON TETRACHLORIDE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
CHLOROBENZENE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
CHLOROETHANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
CHLOROFORM	µg/L	1 U	NA	1 U	1 U	1 U	NA	0.63 J	NA	0.79 J	NA	0.73 J	NA	1	NA	1.1	NA
CHLOROMETHANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
DIBROMOCHLOROMETHANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-121 (FD)	90-FP-024	90-026	90-111	90-205	90-205	90-027	90-FP-033	90-058	90-FP-059	90-075	90-FP-074	90-112	90-FP-090	90-145	90-FP-102
Sample Location		IW-9	LACTATE SOLUTION	MW-40-01	MW-40-01	MW-40-01	MW-40-01	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02
Sample Date		7/5/2005	4/11/2005	3/25/2005	6/30/2005	9/30/2005	9/30/2005	3/25/2005	4/12/2005	4/27/2005	5/12/2005	5/26/2005	6/9/2005	6/30/2005	7/14/2005	7/29/2005	8/10/2005
Analyte	**Units**																
1,1-DICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,2-DICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,1-DICHLOROETHENE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
CIS-1,2-DICHLOROETHENE	µg/L	41	NA	1 U	1 U	1 U	NA	0.97 J	NA	0.65 J	NA	0.41 J	NA	0.39 J	NA	1 U	NA
TRANS-1,2-DICHLOROETHENE	µg/L	0.32 J	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,2-DICHLOROPROPANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
CIS-1,3-DICHLOROPROPENE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
TRANS-1,3-DICHLOROPROPENE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 UJ	NA	1 U	NA	1 U	NA
ETHYLBENZENE	µg/L	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
2-HEXANONE	µg/L	50 U	NA	50 U	50 U	50 U	NA	50 U	NA	50 U	NA	50 U	NA	50 U	NA	50 U	NA
METHYL TERT-BUTYL ETHER	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
4-METHYL-2-PENTANONE	µg/L	50 U	NA	50 U	50 U	50 U	NA	50 U	NA	50 U	NA	50 U	NA	50 U	NA	50 U	NA
METHYLENE CHLORIDE	µg/L	2.3	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
STYRENE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,1,2,2-TETRACHLOROETHANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
TETRACHLOROETHENE	µg/L	0.69 J	NA	1.9	1.9	1.9	NA	11	NA	13	NA	11	NA	15	NA	11	NA
TOLUENE	µg/L	10	NA	0.5 U	0.5 U	0.5 U	NA	0.24 J	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.23 J	NA
1,1,2-TRICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,1,1-TRICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
TRICHLOROETHENE	µg/L	0.73 J	NA	1 U	1 U	1 U	NA	1.3	NA	1.3	NA	1.1	NA	1.4	NA	0.57 J	NA
VINYL ACETATE	µg/L	50 U	NA	50 U	50 U	50 U	NA	50 U	NA	50 UJ	NA	50 U	NA	50 U	NA	50 U	NA
VINYL CHLORIDE	µg/L	7.3	NA	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
XYLENES (TOTAL)	µg/L	0.28 J	NA	1 U	1 U	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
SVOCs (EPA Method 8270C)	µg/L																
ACENAPHTHENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZ[A]ANTHRACENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO[A]PYRENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO[B]FLUORANTHENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO[G,H,I]PERYLENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZOK]FLUORANTHENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-CHLOROETHOXY) METHANE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-CHLOROETHYL) ETHER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-BROMOPHENYL-PHENYL ETHER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BUTYL BENZYL PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-CHLORO-3-METHYLPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-CHLOROANILINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-CHLORONAPHTHALENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-CHLOROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-CHLOROPHENYL-PHENYL ETHER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZ[A,H]ANTHRACENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZOFURAN	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-DICHLOROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-DICHLOROBENZIDINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DICHLOROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIETHYL PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-121 (FD)	90-FP-024	90-026	90-111	90-205	90-205	90-027	90-FP-033	90-058	90-FP-059	90-075	90-FP-074	90-112	90-FP-090	90-145	90-FP-102
Sample Location		**IW-9**	**LACTATE SOLUTION**	**MW-40-01**	**MW-40-01**	**MW-40-01**	**MW-40-01**	**MW-40-02**	**MW-40-02**	**MW-40-02**	**MW-40-02**	**MW-40-02**	**MW-40-02**	**MW-40-02**	**MW-40-02**	**MW-40-02**	**MW-40-02**
Sample Date		**7/5/2005**	**4/11/2005**	**3/25/2005**	**6/30/2005**	**9/30/2005**	**9/30/2005**	**3/25/2005**	**4/12/2005**	**4/27/2005**	**5/12/2005**	**5/26/2005**	**6/9/2005**	**6/30/2005**	**7/14/2005**	**7/29/2005**	**8/10/2005**
Analyte	**Units**																
DIMETHYL PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DIMETHYLPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DI-N-BUTYL PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-DINITRO-2-METHYLPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DINITROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DINITROTOLUENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-DINITROTOLUENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DI-N-OCTYL PHTHALATE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROBUTADIENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROCYCLOPENTADIENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HEXACHLOROETHANE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
INDENO[1,2,3-CD]PYRENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-METHYLPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-NITROANILINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-NITROANILINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-NITROANILINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-NITROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-NITROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-NITROSO-DI-N-PROPYLAMINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-NITROSODIPHENYLAMINE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PENTACHLOROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PYRENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-TRICHLOROBENZENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-TRICHLOROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-TRICHLOROPHENOL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC (EPA Method 9060)																	
TOTAL ORGANIC CARBON	mg/L	NA	NA	2.79	2.23	1.78	NA	3.51	NA	3.69	NA	3.71	NA	3.73	NA	3.33	NA
CHLORIDE-CL	mg/L	NA	NA	40	NA	NA	NA	100	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																	
TEMPERATURE	C	NA	NA	20.88	22.72	23.98	NA	19.86	20.03	20.45	20.47	20.42	21.16	22.17	21.6	21.97	22.28
ALKALINITY	mg/L	NA	NA	389	NA	258	NA	375	285	318	330	348	316	NA	237	261	260
CHEMICAL OXYGEN DEMAND	mg/L	NA	823	0	NA	0	NA	12	0	8	0	0	0	NA	0	23	0
DISSOLVED OXYGEN	mg/L	NA	NA	5.57	4.9	1.94	NA	0.38	0.38	0.09	0.21	0.24	0.1	0.22	0.29	0.31	0.28
IRON	mg/L	NA	NA	0	NA	0	NA	0	0	0	0	0	0	NA	0	0	0
NITRATE	mg/L	NA	NA	1.4	NA	6.4	NA	0.2	0.7	1.3	0.9	0.8	1.7	NA	0.1	0.3	1.2
SULFATE	mg/L	NA	NA	65	NA	85	NA	95	95	150	90	135	100	NA	85	9	200
OXIDATION REDUCTION POTENTIAL	MV	NA	NA	-664	157	30	NA	-619	139	-264	0	237	48	157	132	154	220
DISSOLVED HYDROGEN	nM	NA	NA	1.2	1.7	NA	NA	1.4	NA	1.4	NA	100	NA	1.4	NA	4.2	NA
PH	PH_UNITS	NA	NA	7.41	7.33	7.06	NA	6.76	6.91	6.68	6.88	6.77	7.06	6.69	6.9	7.16	6.86
CARBON DIOXIDE	ppm	NA	NA	21	NA	15.5	NA	31	55	22	25	20	16	NA	17	25	15
SPECIFIC CONDUCTIVITY	µmhos/cm	NA	NA	944	849	1198	NA	1144	1154	1219	1012	1101	993	1004	1023	1050	1080
HYDROGEN SULFIDE	µg/L	NA	NA	0.42 U	0.42 U	0.42 U	NA	0.42 U	NA	0.42 U	NA	0.42 U	NA	0.42 U	NA	0.42 U	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-121 (FD)	90-FP-024	90-026	90-111	90-205	90-205	90-027	90-FP-033	90-058	90-FP-059	90-075	90-FP-074	90-112	90-FP-090	90-145	90-FP-102
Sample Location		IW-9	LACTATE SOLUTION	MW-40-01	MW-40-01	MW-40-01	MW-40-01	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-02
Sample Date		7/5/2005	4/11/2005	3/25/2005	6/30/2005	9/30/2005	9/30/2005	3/25/2005	4/12/2005	4/27/2005	5/12/2005	5/26/2005	6/9/2005	6/30/2005	7/14/2005	7/29/2005	8/10/2005
Analyte	**Units**																
Dissolved Gases (Method RSK-175)																	
CARBON DIOXIDE	µg/L	NA	NA	18000	20000	33000	NA	52000	NA	64000	NA	72000	NA	57000	NA	49000	NA
ETHANE	µg/L	NA	NA	1.3 U	1.3 U	1.3 U	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA
ETHENE	µg/L	NA	NA	1.2 U	1.2 U	1.2 U	NA	1.2 U	NA	1.2 U	NA	1.2 U	NA	1.2 U	NA	1.2 U	NA
METHANE	µg/L	NA	NA	1.5	1.2 U	1.2 U	NA	280	NA	120	NA	33	NA	9.1	NA	4.9	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		**90-162**	**90-163 (FD)**	**90-FP-117**	**90-206**	**90-002**	**90-003 (FD)**	**90-087**	**90-088 (FD)**	**90-177**	**90-013**	**90-060**	**90-079**	**90-108**	**90-FP-083**	**90-147**	**90-FP-103**	**90-159**	**90-200**
Sample Location		**MW-40-02**	**MW-40-02**	**MW-40-02**	**MW-40-02**	**MW-40-06**	**MW-40-06**	**MW-40-06**	**MW-40-06**	**MW-40-06**	**MW-40-07**	**MW-40-07**	**MW-40-07**	**MW-40-07**	**MW-40-07**	**MW-40-07**	**MW-40-07**	**MW-40-07**	**MW-40-07**
Sample Date		**8/23/2005**	**8/23/2005**	**9/16/2005**	**9/30/2005**	**3/21/2005**	**3/21/2005**	**6/27/2005**	**6/27/2005**	**9/26/2005**	**3/23/2005**	**5/3/2005**	**5/26/2005**	**6/30/2005**	**7/13/2005**	**7/29/2005**	**8/10/2005**	**8/23/2005**	**9/29/2005**
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	750	NA	NA	810	1380	NA	1390	NA	1410	1360	NA	1600	1620	NA	1650	NA	1640	1620
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	164	NA	NA	158	NA	NA	399	NA	434	NA	NA	465	422	NA	443	NA	442	426
NITRATE AS N	mg/L	3.69	NA	NA	3.29	NA	NA	2.36	NA	0.999	NA	NA	3.5	3.49 J	NA	2.79	NA	3.33	3.45
NITRITE AS N	mg/L	0.5 U	NA	NA	0.1 U	NA	NA	0.1 U	NA	0.5 U	NA	NA	0.1 U	0.1 U	NA	0.1 U	NA	0.5 U	0.1 U
SULFATE	mg/L	77.3	NA	NA	76.6	NA	NA	272	NA	239	NA	NA	307	315	NA	310	NA	303	297
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	279	NA	NA	289	170	NA	234	NA	180	248	NA	262	249	NA	248	NA	256	249
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	NA	NA	2.24	NA	NA	NA	NA	4.04 J	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																			
NITRITE AS N	mg/L	NA	NA	NA	NA	0.01 U	NA	NA	NA	NA	0.012	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	NA	223	NA	NA	NA	NA	273	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	13.8	NA	NA	15.6	10 U	NA	11.6	NA	12.6	10 U	65.2	10 U	10 U	NA	10 U	NA	11.1	20.9
Metals (EPA Method 6010B)																			
CALCIUM	mg/L	64.9	NA	NA	67.3	123	NA	138	NA	118	148	NA	172	168	NA	174	NA	189	178
IRON	mg/L	0.138	NA	NA	0.158	0.1 U	NA	0.1 U	NA	0.1 U	0.1 U	NA	0.1 U	0.1 U	NA	0.1 U	NA	0.1 U	0.1 U
MAGNESIUM	mg/L	22.5	NA	NA	24.5	40	NA	46.8	NA	39.6	40.9	NA	46.6	44.2	NA	43.9	NA	48.2	44.8
POTASSIUM	mg/L	4.34 J	NA	NA	5 U	4.44 J	NA	4.73 J	NA	5.37	5.08	NA	6.35	4.28 J	NA	3.41 J	NA	6.96	7.33
SODIUM	mg/L	174	NA	NA	188	271	NA	324	NA	302	278	NA	304	288	NA	293	NA	303	311
ANTIMONY	µg/L	NA	NA	NA	NA	300 U	NA	NA	NA	NA	300 U	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	NA	NA	500 U	NA	NA	NA	NA	500 U	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	NA	NA	37.4	NA	NA	NA	NA	71.1	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	NA	NA	3 U	NA	NA	NA	NA	3 U	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	NA	NA	40 U	NA	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	NA	NA	70 U	NA	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	NA	NA	70 U	NA	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	NA	NA	60 U	NA	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	NA	NA	40 U	NA	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	NA	NA	50 U	NA	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	NA	NA	50 U	NA	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	NA	NA	750 U	NA	NA	NA	NA	750 U	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	NA	NA	70 U	NA	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	NA	NA	400 U	NA	NA	NA	NA	400 U	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	NA	NA	80 U	NA	NA	NA	NA	80 U	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	NA	NA	20 U	NA	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	NA	NA	NA	NA	1 U	NA	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	50 U	50 U	NA	50 U	50 UJ	50 UJ	50 UJ	50 UJ	50 U	50 UJ	50 UJ	50 UJ	50 UJ	NA	50 U	NA	50 U	50 U
BENZENE	µg/L	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U
BROMODICHLOROMETHANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
BROMOFORM	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
BROMOMETHANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
2-BUTANONE	µg/L	50 U	50 U	NA	50 U	50 UJ	50 UJ	50 UJ	50 UJ	50 U	50 UJ	50 UJ	50 U	50 UJ	NA	50 U	NA	50 U	50 U
CARBON TETRACHLORIDE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
CHLOROBENZENE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
CHLOROETHANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
CHLOROFORM	µg/L	0.85 J	0.92 J	NA	0.94 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
CHLOROMETHANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
DIBROMOCHLOROMETHANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
1,1-DICHLOROETHANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-162	90-163 (FD)	90-FP-117	90-206	90-002	90-003 (FD)	90-087	90-088 (FD)	90-177	90-013	90-060	90-079	90-108	90-FP-083	90-147	90-FP-103	90-159	90-200
Sample Location		MW-40-02	MW-40-02	MW-40-02	MW-40-02	MW-40-06	MW-40-06	MW-40-06	MW-40-06	MW-40-06	MW-40-07	MW-40-07	MW-40-07	MW-40-07	MW-40-07	MW-40-07	MW-40-07	MW-40-07	MW-40-07
Sample Date		8/23/2005	8/23/2005	9/16/2005	9/30/2005	3/21/2005	3/21/2005	6/27/2005	6/27/2005	9/26/2005	3/23/2005	5/3/2005	5/26/2005	6/30/2005	7/13/2005	7/29/2005	8/10/2005	8/23/2005	9/29/2005
Analyte	**Units**																		
1,2-DICHLOROETHANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
1,1-DICHLOROETHENE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
CIS-1,2-DICHLOROETHENE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.26 J	NA	1 U	NA	0.24 J	0.23 J
TRANS-1,2-DICHLOROETHENE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
1,2-DICHLOROPROPANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 U	NA	1 U	NA	1 U	1 U
ETHYLBENZENE	µg/L	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U
2-HEXANONE	µg/L	50 U	50 U	NA	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	50 U	NA	50 U	50 U
METHYL TERT-BUTYL ETHER	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
4-METHYL-2-PENTANONE	µg/L	50 U	50 U	NA	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	50 U	NA	50 U	50 U
METHYLENE CHLORIDE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
STYRENE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
TETRACHLOROETHENE	µg/L	7.3	7.9	NA	9.6	0.21 J	0.22 J	9	9.1	2.1	48	62	55	68	NA	86	NA	63	110
TOLUENE	µg/L	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.22 J	NA	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
1,1,1-TRICHLOROETHANE	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
TRICHLOROETHENE	µg/L	0.45 J	0.49 J	NA	0.56 J	1 U	1 U	1 U	1 U	1 U	0.76 J	1 J	0.89 J	1.5	NA	1.7	NA	1.3	1.7
VINYL ACETATE	µg/L	50 U	50 U	NA	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	50 U	NA	50 U	50 U
VINYL CHLORIDE	µg/L	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U
XYLENES (TOTAL)	µg/L	1 U	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	2.63	NA	NA	2.89	1 U	NA	1.2	NA	1.49	1.27	NA	1.33	1.71	NA	1.79	NA	1.25	2.37
CHLORIDE-CL	mg/L	NA	NA	NA	NA	490	NA	NA	NA	NA	430	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	23.42	NA	22.98	23.2	22.97	NA	23.11	NA	24.04	22.99	23.61	23.45	23.42	23.98	23.6	23.93	23.68	23.84
ALKALINITY	mg/L	188	NA	270	230	154	NA	208	NA	172	218	NA	238	NA	238	239	23.6	210	228
CHEMICAL OXYGEN DEMAND	mg/L	0	NA	79	14	37	NA	0	NA	0	0	3	16	NA	0	6	0	0	0
DISSOLVED OXYGEN	mg/L	0.35	NA	0.16	0.16	0.63	NA	0.13	NA	0.16	0.43	0.32	0.19	0.24	0.25	0.18	0.19	0.2	0.24
IRON	mg/L	0	NA	0	0	0	NA	0	NA	0	0.2	NA	0	NA	0	0	0	0	0
NITRATE	mg/L	0.8	NA	6.1	7.4	3.8	NA	1.5	NA	2.3	1.1	NA	0.8	NA	1.6	0.7	1.5	1.1	40
SULFATE	mg/L	95	NA	100	125	200	NA	200	NA	200	200	NA	200	NA	160	200	200	200	200
OXIDATION REDUCTION POTENTIAL	MV	136	NA	2	42	-660	NA	203	NA	148	NA	250	162	151	124	153	216	125	66
DISSOLVED HYDROGEN	nM	3.4	NA	NA	NA	1.5	NA	1.7	NA	NA	0.88	NA	NA	1	NA	NA	NA	NA	NA
PH	PH_UNITS	7.04	NA	6.92	6.69	7.21	NA	6.9	NA	7.1	7.31	7.12	7.07	7.11	6.89	7.28	7.19	7.29	7.05
CARBON DIOXIDE	ppm	13	NA	18	16	15	NA	14.5	NA	15	20	NA	16	NA	11	23	13	15	18
SPECIFIC CONDUCTIVITY	µmhos/cm	1174	NA	1242	1248	2200	NA	2220	NA	2280	2130	2220	2320	2040	2100	2140	2190	2220	2470
HYDROGEN SULFIDE	µg/L	0.42 U	NA	NA	0.42 U	0.42 U	NA	0.42 U	NA	0.42 U	0.42 U	NA	NA	0.42 U	NA	NA	NA	NA	0.42 U
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	36000	NA	NA	45000	13000	NA	40000	NA	21000	22000	NA	29000	28000	NA	33000	NA	26000	37000
ETHANE	µg/L	1.3 U	NA	NA	1.3 U	1.3 U	NA	1.3 U	NA	1.3 U	1.3 U	NA	1.3 U	1.3 U	NA	1.3 U	NA	1.3 U	1.3 U
ETHENE	µg/L	1.2 U	NA	NA	1.2 U	1.2 U	NA	1.2 U	NA	1.2 U	1.2 U	NA	1.2 U	1.2 U	NA	1.2 U	NA	1.2 U	1.2 U
METHANE	µg/L	190	NA	NA	2000	560	NA	250	NA	420	1.2 U	NA	1.2 U	1.2 U	NA	930	NA	160	43

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-018 MW-40-08 3/24/2005	90-103 MW-40-08 6/29/2005	90-194 MW-40-08 9/28/2005	90-001 MW-40-10 3/21/2005	90-086 MW-40-10 6/27/2005	90-176 MW-40-10 9/26/2005	90-024 MW-40-11 3/25/2005	90-025 (FD) MW-40-11 3/25/2005	90-118 MW-40-11 7/1/2005	90-203 MW-40-11 9/29/2005	90-014 MW-40-13 3/23/2005	90-116 MW-40-13 7/1/2005	90-201 MW-40-13 9/29/2005	90-005 MW-40-14 3/22/2005	90-FP-009 MW-40-14 4/4/2005	90-FP-021 MW-40-14 4/11/2005	90-043 MW-40-14 4/26/2005	90-FP-037 MW-40-14 5/4/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	1050	1040	1060	5380	6030	7360	6500	NA	6780	7760	7250	8930	9080	1990	NA	NA	2120	NA
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	NA	231	213	NA	3150	2950	NA	NA	3180	3030	NA	3730	3620	NA	NA	NA	795	NA
NITRATE AS N	mg/L	NA	6.31	5.72	NA	0.1 U	0.1 U	NA	NA	0.1 U	0.1 U	NA	0.339	0.182	NA	NA	NA	0.1 U	NA
NITRITE AS N	mg/L	NA	0.1 U	0.1 U	NA	5 U	0.5 U	NA	NA	NA	0.1 U	NA	NA	0.1 U	NA	NA	NA	0.1 U	NA
SULFATE	mg/L	NA	181	165	NA	379	394	NA	NA	422	419	NA	431	449	NA	NA	NA	261	NA
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	301	290	284	128	123	228	133	NA	139	187	140	144	139	219	NA	NA	186	NA
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	5.79	NA	NA	0.1 U	NA	NA	0.12	NA	NA	NA	0.239 J	NA	NA	2.8	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																			
NITRITE AS N	mg/L	0.01 U	NA	NA	0.01 U	NA	NA	0.034	NA	0.036 J	NA	0.01 U	0.01 U	NA	0.011	NA	NA	NA	NA
SULFATE	mg/L	187	NA	NA	355	NA	NA	356	NA	NA	NA	405	NA	NA	392	NA	NA	NA	NA
COD	mg/L	11.3	10 U	10 U	43.8	92.6	62.8	76.3	NA	120	86	123	120	120	14.6	NA	NA	61.4	NA
Metals (EPA Method 6010B)																			
CALCIUM	mg/L	105	97.3	93.2	589	660	589	762	NA	785	765	674	691	630	266	NA	NA	315	NA
IRON	mg/L	0.1 U	0.1 U	0.1 U	0.483	0.826	0.569	0.0532 J	NA	0.0801 J	0.503	0.1 U	0.1 U	0.1 U	0.136	NA	NA	4.43	NA
MAGNESIUM	mg/L	31.3	31.2	28.9	229	322	248	281	NA	270	277	404	376	419	61.6	NA	NA	72.1	NA
POTASSIUM	mg/L	2.73 J	5 U	5 U	13.4	15.2	13.9	15.8	NA	16.1	17.1	13.5	14.2	14	5.54	NA	NA	5.89	NA
SODIUM	mg/L	237 J	251	237	608	805	650	836 J	NA	1040	969	1210	1380	1010	247	NA	NA	237	NA
ANTIMONY	µg/L	300 U	NA	NA	300 U	NA	NA	300 U	NA	NA	NA	300 U	NA	NA	300 U	NA	NA	300 U	NA
ARSENIC	µg/L	500 U	NA	NA	500 U	NA	NA	500 U	NA	NA	NA	500 U	NA	NA	500 U	NA	NA	500 U	NA
BARIUM	µg/L	56.3	NA	NA	119	NA	NA	92.5	NA	NA	NA	230	NA	NA	88.7	NA	NA	104	NA
BERYLLIUM	µg/L	3 U	NA	NA	3 U	NA	NA	3 U	NA	NA	NA	3 U	NA	NA	3 U	NA	NA	3 U	NA
CADMIUM	µg/L	40 U	NA	NA	40 U	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	40 U	NA	NA	40 U	NA
CHROMIUM	µg/L	70 U	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	26.3 J	NA	NA	11.5 J	NA
COBALT	µg/L	70 U	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	70 U	NA	NA	70 U	NA
COPPER	µg/L	60 U	NA	NA	60 U	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	60 U	NA	NA	60 U	NA
LEAD	µg/L	40 U	NA	NA	40 U	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	40 U	NA	NA	40 U	NA
MOLYBDENUM	µg/L	50 U	NA	NA	50 U	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	NA	50 U	NA
NICKEL	µg/L	50 U	NA	NA	50 U	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	NA	102	NA
SELENIUM	µg/L	750 U	NA	NA	750 U	NA	NA	750 U	NA	NA	NA	750 U	NA	NA	750 U	NA	NA	750 U	NA
SILVER	µg/L	70 U	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	70 U	NA	NA	70 U	NA
THALLIUM	µg/L	400 U	NA	NA	400 U	NA	NA	400 U	NA	NA	NA	400 U	NA	NA	400 U	NA	NA	400 U	NA
VANADIUM	µg/L	80 U	NA	NA	80 U	NA	NA	80 U	NA	NA	NA	80 U	NA	NA	80 U	NA	NA	80 U	NA
ZINC	µg/L	10.7 J	NA	NA	20 U	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	20 U	NA	NA	20 U	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	1 U	NA	NA	1 U	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	50 UJ	50 UJ	50 U	50 UJ	50 UJ	50 U	50 UJ	50 UJ	50 UJ	50 U	50 UJ	50 UJ	50 U	50 UJ	NA	NA	50 UJ	NA
BENZENE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	NA
BROMODICHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
BROMOFORM	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
BROMOMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
2-BUTANONE	µg/L	50 U	50 UJ	50 U	50 UJ	50 UJ	50 U	50 UJ	50 UJ	50 UJ	50 U	50 UJ	50 UJ	50 U	50 UJ	NA	NA	50 UJ	NA
CARBON TETRACHLORIDE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
CHLOROBENZENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
CHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
CHLOROFORM	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
CHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
DIBROMOCHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
1,1-DICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-018	90-103	90-194	90-001	90-086	90-176	90-024	90-025 (FD)	90-118	90-203	90-014	90-116	90-201	90-005	90-FP-009	90-FP-021	90-043	90-FP-037
Sample Location		MW-40-08	MW-40-08	MW-40-08	MW-40-10	MW-40-10	MW-40-10	MW-40-11	MW-40-11	MW-40-11	MW-40-11	MW-40-13	MW-40-13	MW-40-13	MW-40-14	MW-40-14	MW-40-14	MW-40-14	MW-40-14
Sample Date		3/24/2005	6/29/2005	9/28/2005	3/21/2005	6/27/2005	9/26/2005	3/25/2005	3/25/2005	7/1/2005	9/29/2005	3/23/2005	7/1/2005	9/29/2005	3/22/2005	4/4/2005	4/11/2005	4/26/2005	5/4/2005
Analyte	**Units**																		
1,2-DICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
1,1-DICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
CIS-1,2-DICHLOROETHENE	µg/L	0.22 J	0.34 J	0.21 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.2	NA	NA	70	NA
TRANS-1,2-DICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	0.34 J	NA
1,2-DICHLOROPROPANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
CIS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
TRANS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
ETHYLBENZENE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	NA
2-HEXANONE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	NA	50 U	NA
METHYL TERT-BUTYL ETHER	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
4-METHYL-2-PENTANONE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	NA	50 U	NA
METHYLENE CHLORIDE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
STYRENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
1,1,2,2-TETRACHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
TETRACHLOROETHENE	µg/L	7.3	10	7.5	1 U	0.21 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	300	NA	NA	68	NA
TOLUENE	µg/L	0.37 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	NA
1,1,2-TRICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
1,1,1-TRICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
TRICHLOROETHENE	µg/L	1.2	1.9	1.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.7	NA	NA	30	NA
VINYL ACETATE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	NA	50 U	NA
VINYL CHLORIDE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	0.38 J	NA
XYLENES (TOTAL)	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	1 U	NA
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	2.76	2.48	3.74	1 U	0.576 J	1.01	1 U	NA	1 U	1.49	1 U	1.01	1.46	1.08	NA	NA	16.5	NA
CHLORIDE-CL	mg/L	250 J	NA	NA	2500	NA	NA	3150	NA	NA	NA	4150	NA	NA	600	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	19.24	20.22	20.95	22.22	22.39	22.65	21.8	NA	22.94	23.62	22.51	23.31	23.98	21.35	21.77	21.59	21.58	21.67
ALKALINITY	mg/L	286	240	260	117	145	94	197	NA	1250	110	116	113	126	160	NA	350	341	NA
CHEMICAL OXYGEN DEMAND	mg/L	29	33	8	47	45	21	52	NA	48	113	88	122	64	34	NA	15	0	0
DISSOLVED OXYGEN	mg/L	2.1	0.61	0.25	7.17	0.61	0.22	0.69	NA	0.14	0.23	0.47	0.18	0.2	0.3	0.21	0.17	0.07	0.22
IRON	mg/L	0.4	0	0	1.2	0.4	0.6	0	NA	0	0	0	0	0	0	NA	0	4	NA
NITRATE	mg/L	0.8	0.8	9.2	0.7	0	1.5	0.6	NA	0.6	0.4	0.7	35	1.8	2.7	NA	0.9	1.6	NA
SULFATE	mg/L	200	200	200	200	200	200	200	NA	200	200	200	200	200	200	NA	200	200	NA
OXIDATION REDUCTION POTENTIAL	MV	NA	88	32	-504	174	127	-615	NA	107	52	NA	77	67	-504	68	-89	-288	-74
DISSOLVED HYDROGEN	nM	1.2	1.9	NA	1	1.8	NA	1.4	NA	2.4	NA	1.1	4.7	NA	0.74	NA	NA	17	NA
PH	PH_UNITS	7.25	6.99	7.03	7.03	6.76	6.86	7.07	NA	6.68	6.83	6.84	6.65	6.65	7.24	6.67	6.71	6.68	7.35
CARBON DIOXIDE	ppm	23	20	19	16	18	14	32	NA	15	11	30	19	17	19	NA	100	10	NA
SPECIFIC CONDUCTIVITY	µmhos/cm	1750	1680	1660	8990	9690	9060	9500	NA	8270	10120	1136	9760	11560	2820	2890	3070	3180	2900
HYDROGEN SULFIDE	µg/L	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	NA	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	NA	NA	0.42 U	NA
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	25000	42000	32000	17000	19000	19000	15000	NA	21000	18000	23000	32000	27000	14000	NA	NA	100000	NA
ETHANE	µg/L	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	NA	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	NA	NA	1.3 U	NA
ETHENE	µg/L	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	NA	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	NA	NA	1.2 U	NA
METHANE	µg/L	0.77 J	1.2 U	1.2 U	49	110	79	58	NA	51	23	1.2 U	55	5.6	6300	NA	NA	7000	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-047 MW-40-14 5/10/2005	90-063 MW-40-14 5/24/2005	90-063 MW-40-14 5/24/2005	90-FP-065 MW-40-14 6/9/2005	90-090 MW-40-14 6/27/2005	90-FP-078 MW-40-14 7/13/2005	90-132 MW-40-14 7/26/2005	90-FP-092 MW-40-14 8/9/2005	90-151 MW-40-14 8/22/2005	90-FP-106 MW-40-14 9/15/2005	90-179 MW-40-14 9/26/2005	90-016 MW-40-15 3/24/2005	90-106 MW-40-15 6/30/2005	90-196 MW-40-15 9/28/2005	90-017 MW-40-17 3/24/2005
Analyte	**Units**															
Residue, Filterable (EPA Method 160.1)																
TDS	mg/L	NA	2380	NA	NA	2340	NA	2630	NA	7190	NA	4280	1590	1590	1720	1080
Ion Chromatography (EPA Method 300.0)																
CHLORIDE	mg/L	NA	659 J	NA	NA	535	NA	497	NA	445	NA	389	NA	420	423	NA
NITRATE AS N	mg/L	NA	0.1 U	NA	NA	0.1 U	NA	0.0859 J	NA	0.1 U	NA	0.1 U	NA	3.67 J	3.67	NA
NITRITE AS N	mg/L	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U	NA	1 U	NA	0.5 U	NA	0.1 U	0.1 U	NA
SULFATE	mg/L	NA	158	NA	NA	169	NA	188	NA	159	NA	138	NA	263	242	NA
Total Alkalinity (EPA Method 310.1)																
ALKALINITY	mg/L	NA	620	NA	NA	720	NA	797	NA	1260	NA	1610	288	292	282	306
Nitrogen as Nitrate (EPA Method 353.3)																
NITRATE-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.49	NA	NA	4.93
Nitrogen as Nitrite (EPA Method 354.1)																
NITRITE AS N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01 U	NA	NA	0.01 U
SULFATE	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	290	NA	NA	233
COD	mg/L	NA	533	NA	NA	1010	NA	1080	NA	2080	NA	2010	10 U	10 U	10 U	10 U
Metals (EPA Method 6010B)																
CALCIUM	mg/L	NA	355	NA	NA	127	NA	382	NA	348	NA	332	196	197	197	129
IRON	mg/L	NA	9.16	NA	NA	9.99	NA	14.3	NA	17.6	NA	26.8	0.1 U	0.1 U	0.1 U	0.1 U
MAGNESIUM	mg/L	NA	87.4	NA	NA	36.5	NA	95.8	NA	84.3	NA	82.2	60.5	61	63.4	32.3
POTASSIUM	mg/L	NA	5.33	NA	NA	4.52 J	NA	6.55	NA	7.43	NA	9.43	4.88 J	4.93 J	5.22	3.75 J
SODIUM	mg/L	NA	262	NA	NA	632	NA	308	NA	605	NA	772	240 J	237	265	167 J
ANTIMONY	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	300 U	NA	NA	300 U
ARSENIC	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500 U	NA	NA	500 U
BARIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	40.2	NA	NA	27.8
BERYLLIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 U	NA	NA	3 U
CADMIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	40 U	NA	NA	40 U
CHROMIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	70 U	NA	NA	70 U
COBALT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	70 U	NA	NA	70 U
COPPER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	60 U	NA	NA	60 U
LEAD	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	40 U	NA	NA	40 U
MOLYBDENUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	NA	NA	50 U
NICKEL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	NA	NA	50 U
SELENIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	750 U	NA	NA	750 U
SILVER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	70 U	NA	NA	70 U
THALLIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	400 U	NA	NA	400 U
VANADIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	80 U	NA	NA	80 U
ZINC	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12.6 J	NA	NA	22.8
Mercury (EPA Method 7470A)																
MERCURY	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA	NA	1 U
VOCs (EPA Method 8260B)																
ACETONE	µg/L	NA	50 UJ	NA	NA	10 J	NA	50 U	NA	7.4 J	NA	50 U	50 UJ	50 UJ	50 U	50 UJ
BENZENE	µg/L	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
BROMOFORM	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
BROMOMETHANE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
2-BUTANONE	µg/L	NA	50 UJ	NA	NA	24 J	NA	12 J	NA	13 J	NA	21 J	50 U	50 UJ	50 U	50 U
CARBON TETRACHLORIDE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	µg/L	NA	1 U	NA	NA	1 U	NA	0.26 J	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-047 MW-40-14 5/10/2005	90-063 MW-40-14 5/24/2005	90-063 MW-40-14 5/24/2005	90-FP-065 MW-40-14 6/9/2005	90-090 MW-40-14 6/27/2005	90-FP-078 MW-40-14 7/13/2005	90-132 MW-40-14 7/26/2005	90-FP-092 MW-40-14 8/9/2005	90-151 MW-40-14 8/22/2005	90-FP-106 MW-40-14 9/15/2005	90-179 MW-40-14 9/26/2005	90-016 MW-40-15 3/24/2005	90-106 MW-40-15 6/30/2005	90-196 MW-40-15 9/28/2005	90-017 MW-40-17 3/24/2005
Analyte	**Units**															
1,2-DICHLOROETHANE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	µg/L	NA	0.26 J	NA	NA	0.39 J	NA	0.38 J	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
CIS-1,2-DICHLOROETHENE	µg/L	NA	150	NA	NA	180	NA	74	NA	80	NA	70	1 U	1 U	1 U	1 U
TRANS-1,2-DICHLOROETHENE	µg/L	NA	0.62 J	NA	NA	0.86 J	NA	0.45 J	NA	0.59 J	NA	0.72 J	1 U	1 U	1 U	1 U
1,2-DICHLOROPROPANE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	µg/L	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-HEXANONE	µg/L	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U	50 U	50 U	50 U	50 U
METHYL TERT-BUTYL ETHER	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
4-METHYL-2-PENTANONE	µg/L	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U	50 U	50 U	50 U	50 U
METHYLENE CHLORIDE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	0.74 J	NA	1	1 U	1 U	1 U	1 U
STYRENE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	µg/L	NA	10	11	NA	55	NA	100	NA	14	NA	2.4	1 U	1 U	0.26 J	0.51 J
TOLUENE	µg/L	NA	2.2	NA	NA	3.9	NA	1.7	NA	2.8	NA	3.1	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
1,1,1-TRICHLOROETHANE	µg/L	NA	1 U	NA	NA	1 U	NA	0.3 JB	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	µg/L	NA	3.6	NA	NA	13	NA	23	NA	3.2	NA	2	1 U	1 U	0.26 J	1 U
VINYL ACETATE	µg/L	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U	50 U	50 U	50 U	50 U
VINYL CHLORIDE	µg/L	NA	0.62	NA	NA	2.3	NA	14	NA	13	NA	7	0.5 U	0.5 U	0.5 U	0.5 U
XYLENES (TOTAL)	µg/L	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U
TOC (EPA Method 9060)																
TOTAL ORGANIC CARBON	mg/L	NA	156	NA	NA	363	NA	325	NA	625	NA	762	1.04	1.04	2.2	3.4
CHLORIDE-CL	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	450 J	NA	NA	2.35 J
Field Measurements																
TEMPERATURE	C	21.76	22.09	NA	22.06	22.75	22.29	22.78	22.62	22.61	22.58	22.74	21.24	21.44	22.71	19.55
ALKALINITY	mg/L	310	600	NA	590	670	710	560	574	888	84	1220	255	NA	270	278
CHEMICAL OXYGEN DEMAND	mg/L	0	75	NA	123	648	162	415	103	812	407	967	8	NA	0	28
DISSOLVED OXYGEN	mg/L	0.18	0.21	NA	0.11	0.06	0.29	0.13	0.17	0.13	0.13	0.07	2.83	0.19	0.2	1.06
IRON	mg/L	2.1	4.6	NA	3.8	4	5.2	5.6	2.9	6.9	7.2	4.4	0.2	NA	0	0
NITRATE	mg/L	1.7	5.8	NA	0	2.5	2.9	10.5	31	28.5	35	3.6	0.4	NA	6.8	0.5
SULFATE	mg/L	200	200	NA	200	200	175	200	125	200	200	195	200	NA	200	100
OXIDATION REDUCTION POTENTIAL	MV	-68	-55	NA	-187	-199	20	2	155	94	-133	-241	NA	149	52	NA
DISSOLVED HYDROGEN	nM	NA	47	NA	NA	1.5	NA	2.2	NA	2	NA	NA	1.2	0.95	NA	0.5
PH	PH_UNITS	6.63	6.42	NA	6.57	6.05	6.36	6.2	5.89	6.05	6.04	5.91	7.28	7	6.89	7.32
CARBON DIOXIDE	ppm	40	75	NA	100	90	55	9	80	375	100	375	25	NA	22	25
SPECIFIC CONDUCTIVITY	µmhos/cm	2670	3150	NA	2920	3200	2850	2650	2830	3280	3690	4260	2310	2010	2460	1680
HYDROGEN SULFIDE	µg/L	NA	0.42 U	NA	NA	0.42 U	NA	0.42 U	NA	2.39	NA	12.5	0.42 U	0.42 U	0.42 U	0.42 U
Dissolved Gases (Method RSK-175)																
CARBON DIOXIDE	µg/L	NA	220000	NA	NA	360000	NA	500000	NA	680000	NA	760000	26000	44000	44000	23000
ETHANE	µg/L	NA	1.3 U	NA	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
ETHENE	µg/L	NA	1.2 U	NA	NA	1.2 U	NA	2.8	NA	3.6	NA	3.4	1.2 U	1.2 U	1.2 U	1.2 U
METHANE	µg/L	NA	10000	NA	NA	8200	NA	10000	NA	8900	NA	10000	1.1 J	8.7	44	320

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-104	90-195	90-012	90-095	90-181	90-011	90-115	90-182	90-183 (FD)	90-004	90-FP-007	90-FP-008	90-FP-020	90-042	90-FP-046	90-062	90-FP-064	90-089
Sample Location		MW-40-17	MW-40-17	MW-40-19	MW-40-19	MW-40-19	MW-40-20	MW-40-20	MW-40-20	MW-40-20	MW-40-22	MW-40-22	MW-40-22	MW-40-22	MW-40-22	MW-40-22	MW-40-22	MW-40-22	MW-40-22
Sample Date		6/29/2005	9/28/2005	3/23/2005	6/28/2005	9/27/2005	3/23/2005	7/1/2005	9/27/2005	9/27/2005	3/22/2005	4/4/2005	4/4/2005	4/11/2005	4/25/2005	5/10/2005	5/24/2005	6/9/2005	6/27/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	1010	1230	620	685	630	7750	9480	10200	NA	2230	NA	NA	NA	2290	NA	2510	NA	2140
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	203	255	NA	164	148	NA	3530	2440	NA	NA	NA	NA	NA	257	NA	294 J	NA	289
NITRATE AS N	mg/L	5.3	5.42	NA	2.42 J	2.79	NA	0.1 U	0.2 U	NA	NA	NA	NA	NA	0.1 U	NA	0.1 U	NA	0.1 U
NITRITE AS N	mg/L	0.1 U	0.1 U	NA	0.12	0.1 U	NA	NA	0.2 U	NA	NA	NA	NA	NA	0.1 U	NA	0.1 U	NA	0.1 U
SULFATE	mg/L	161	177	NA	112	101	NA	156	6.11	NA	NA	NA	NA	NA	54.7	NA	67.9	NA	56.8
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	290	279	130	179	152	145	1070	2360	NA	1470	NA	NA	NA	1400	NA	1360	NA	1390
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	2.79 J	NA	NA	0.205 J	NA	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																			
NITRITE AS N	mg/L	NA	NA	0.01 U	NA	NA	0.01 U	0.01 U	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	117	NA	NA	461	NA	NA	NA	61.6	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	10 U	10 U	11.7	10 U	10 U	134	1260	4520	NA	20.4	NA	NA	NA	34.5	NA	14.8	NA	40.5
Metals (EPA Method 6010B)																			
CALCIUM	mg/L	137	167	47.6	51.1	49	805	782	1040	NA	28.6	NA	NA	NA	48.3	NA	43	NA	47.9
IRON	mg/L	0.1 U	0.1 U	0.0671 J	0.0988 J	0.056 J	0.1 U	0.843	28.9	NA	5.22	NA	NA	NA	9.84	NA	9.71	NA	11
MAGNESIUM	mg/L	33.7	40.2	13	14.5	12.9	372	368	318	NA	11.5	NA	NA	NA	19.3	NA	16.6	NA	18
POTASSIUM	mg/L	5.18	3.83 J	5 U	2.3 J	3.26 J	20.2	13.5	20.3	NA	3.93 J	NA	NA	NA	3.54 J	NA	3.78 J	NA	4.32 J
SODIUM	mg/L	174	177	166	187	156	1470	1620	1520	NA	814	NA	NA	NA	838	NA	737	NA	806
ANTIMONY	µg/L	NA	NA	300 U	NA	NA	300 U	NA	NA	NA	300 U	NA	NA	NA	300 U	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	500 U	NA	NA	500 U	NA	NA	NA	102 J	NA	NA	NA	119 J	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	11.1 J	NA	NA	97.4	NA	NA	NA	58.5	NA	NA	NA	82.6	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	3 U	NA	NA	3 U	NA	NA	NA	3 U	NA	NA	NA	3 U	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	40 U	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA
COBALT	µg/L	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA
COPPER	µg/L	NA	NA	60 U	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA	NA
LEAD	µg/L	NA	NA	40 U	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	50 U	NA	NA	24.7 J	NA	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	50 U	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	750 U	NA	NA	750 U	NA	NA	NA	750 U	NA	NA	NA	750 U	NA	NA	NA	NA
SILVER	µg/L	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	400 U	NA	NA	400 U	NA	NA	NA	400 U	NA	NA	NA	400 U	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	80 U	NA	NA	80 U	NA	NA	NA	80 U	NA	NA	NA	80 U	NA	NA	NA	NA
ZINC	µg/L	NA	NA	20 U	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	NA	NA	1 U	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	50 UJ	50 U	50 UJ	50 UJ	50 U	50 UJ	250 J	67	75	50 UJ	NA	NA	NA	50 UJ	NA	50 UJ	NA	50 UJ
BENZENE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
BROMODICHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
BROMOFORM	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
BROMOMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
2-BUTANONE	µg/L	50 UJ	50 U	50 UJ	50 UJ	50 U	50 UJ	1500 J	410 J	380 J	50 UJ	NA	NA	NA	50 UJ	NA	50 UJ	NA	50 UJ
CARBON TETRACHLORIDE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROBENZENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROFORM	µg/L	1 U	0.23 J	1 U	1 U	1 U	1 U	0.22 J	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
DIBROMOCHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
1,1-DICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-104 MW-40-17 6/29/2005	90-195 MW-40-17 9/28/2005	90-012 MW-40-19 3/23/2005	90-095 MW-40-19 6/28/2005	90-181 MW-40-19 9/27/2005	90-011 MW-40-20 3/23/2005	90-115 MW-40-20 7/1/2005	90-182 MW-40-20 9/27/2005	90-183 (FD) MW-40-20 9/27/2005	90-004 MW-40-22 3/22/2005	90-FP-007 MW-40-22 4/4/2005	90-FP-008 MW-40-22 4/4/2005	90-FP-020 MW-40-22 4/11/2005	90-042 MW-40-22 4/25/2005	90-FP-046 MW-40-22 5/10/2005	90-062 MW-40-22 5/24/2005	90-FP-064 MW-40-22 6/9/2005	90-089 MW-40-22 6/27/2005
Analyte	**Units**																		
1,2-DICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
1,1-DICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
CIS-1,2-DICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.4	NA	NA	NA	3	NA	2.3	NA	2.2
TRANS-1,2-DICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.41 J	NA	NA	NA	0.48 J	NA	0.29 J	NA	0.38 J
1,2-DICHLOROPROPANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
ETHYLBENZENE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
2-HEXANONE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	50 U	NA	50 U	NA	50 U
METHYL TERT-BUTYL ETHER	µg/L	1 U	1 U	0.28 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
4-METHYL-2-PENTANONE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	50 U	NA	50 U	NA	50 U
METHYLENE CHLORIDE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2	2.2	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
STYRENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
TETRACHLOROETHENE	µg/L	0.51 J	16	0.46 J	1.4	1.1	1 U	0.41 J	0.37 J	0.39 J	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
TOLUENE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.42 J	0.98	1	0.5 U	NA	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
1,1,1-TRICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
TRICHLOROETHENE	µg/L	1 U	0.21 J	1 U	1 U	1 U	1 U	1 U	0.47 J	0.45 J	1.5	NA	NA	NA	2.7	NA	1.9	NA	1.2
VINYL ACETATE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	50 U	NA	50 U	NA	50 U
VINYL CHLORIDE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	1.9	NA	1.3	NA	1.6
XYLENES (TOTAL)	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	2.99	3.94	1.72	2.4	3.03	1 U	490	1630	NA	4.83	NA	NA	NA	4.5	NA	4.04	NA	4.21
CHLORIDE-CL	mg/L	NA	NA	200	NA	NA	4500	NA	NA	NA	270	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	20.65	21.08	21.54	21.8	22.21	21.24	21.57	22.42	NA	22.03	NA	22.67	22.89	22.61	22.39	22.72	22.68	23.76
ALKALINITY	mg/L	260	264	125	135	154	137	700	1730	NA	1210	NA	NA	1400	1480	1410	1190	1020	1410
CHEMICAL OXYGEN DEMAND	mg/L	27	0	0	0	0	139	918	2758	NA	29	0	NA	17	7	11	0	0	60
DISSOLVED OXYGEN	mg/L	0.14	0.14	0.84	0.15	0.36	1.3	0.15	0.1	NA	0.29	NA	0.33	0.3	0.02	0.21	0.19	0.1	0.06
IRON	mg/L	0	0	0.4	0	0	0	0	9.4	NA	3.8	NA	NA	3.1	2.6	0	0	0.4	2.4
NITRATE	mg/L	0.7	9.5	2.7	0.8	6.4	0.6	0	0	NA	3.7	NA	NA	0	9.4	14.5	11	13.9	3.5
SULFATE	mg/L	200	200	125	125	195	200	200	50	NA	50	NA	NA	50	65	90	100	50	80
OXIDATION REDUCTION POTENTIAL	MV	110	44	-833	135	96	-770	-66	-287	NA	-482	NA	-190	-148	0.93	-36	-30	20	-23
DISSOLVED HYDROGEN	nM	1.4	NA	0.58	2.3	NA	1	99	NA	NA	0.8	NA	NA	NA	0.93	NA	2.1	NA	1.9
PH	PH_UNITS	7.01	7.07	7.55	7.35	7.36	6.96	6.49	6.08	NA	7.09	NA	6.86	6.92	6.84	6.77	6.81	7.14	6.53
CARBON DIOXIDE	ppm	14.5	17	13	10	10	35	140	375	NA	190	NA	NA	130	170	1.15	70	60	16
SPECIFIC CONDUCTIVITY	µmhos/cm	1540	1800	1064	1130	1076	12900	10580	11800	NA	3430	NA	3330	3390	3550	3150	3170	2960	3350
HYDROGEN SULFIDE	µg/L	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	395	1290	NA	0.42 U	NA	NA	NA	0.42 U	NA	0.42 U	NA	0.42 U
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	31000	29000	8000	14000	11000	22000	180000	1000000	NA	320000	NA	NA	NA	310000	NA	220000	NA	400000
ETHANE	µg/L	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	NA	1.3 U	NA	NA	NA	1.3 U	NA	1.3 U	NA	1.3 U
ETHENE	µg/L	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	NA	1.1 J	NA	NA	NA	1.2	NA	1.2 J	NA	1 J
METHANE	µg/L	120	950	0.99 J	32	0.75 J	1.2 U	2.2	11000	NA	6700	NA	NA	NA	6800	NA	11000	NA	6600

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-077 MW-40-22 7/13/2005	90-131 MW-40-22 7/26/2005	90-FP-091 MW-40-22 8/9/2005	90-150 MW-40-22 8/22/2005	90-FP-105 MW-40-22 9/15/2005	90-178 MW-40-22 9/26/2005	90-022 MW-40-30 3/24/2005	90-FP-006 MW-40-30 4/4/2005	90-FP-014 MW-40-30 4/4/2005	90-FP-030 MW-40-30 4/12/2005	90-050 MW-40-30 4/27/2005	90-FP-043 MW-40-30 5/4/2005	90-FP-056 MW-40-30 5/12/2005	90-070 MW-40-30 5/25/2005	90-FP-070 MW-40-30 6/9/2005	90-100 MW-40-30 6/29/2005	90-FP-086 MW-40-30 7/14/2005	90-140 MW-40-30 7/27/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	NA	2210	NA	2130	NA	2120	860	NA	NA	NA	810	NA	NA	840	NA	725	NA	820
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	NA	326	NA	280	NA	287	NA	NA	NA	NA	210	NA	NA	200	NA	195	NA	186
NITRATE AS N	mg/L	NA	0.1 U	NA	0.1 U	NA	0.1 U	NA	NA	NA	NA	4.31	NA	NA	0.1 UJ	NA	0.1 U	NA	0.072 J
NITRITE AS N	mg/L	NA	0.1 U	NA	1 U	NA	0.5 U	NA	NA	NA	NA	0.1 U	NA	NA	0.1 UJ	NA	0.1 U	NA	0.1 U
SULFATE	mg/L	NA	74	NA	66.4	NA	66	NA	NA	NA	NA	199	NA	NA	129	NA	59	NA	114
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	NA	1380	NA	1360	NA	1300	238	NA	NA	NA	291	NA	NA	249	NA	254	NA	255
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	NA	NA	NA	NA	0.512	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																			
NITRITE AS N	mg/L	NA	NA	NA	NA	NA	NA	0.225	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	NA	NA	NA	149	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	NA	14.6	NA	55.3	NA	30.1	25.4	NA	NA	NA	23.7	NA	NA	10 U	NA	17.4	NA	10 U
Metals (EPA Method 6010B)																			
CALCIUM	mg/L	NA	50.8	NA	50.5	NA	51.1	78.6	NA	NA	NA	77.6	NA	NA	67.9	NA	63.8	NA	78
IRON	mg/L	NA	11.7	NA	10.9	NA	11.2	0.1	NA	NA	NA	0.1 U	NA	NA	0.1 U	NA	0.0581 J	NA	0.134
MAGNESIUM	mg/L	NA	18.8	NA	18	NA	18.2	25.4	NA	NA	NA	22.7	NA	NA	20.4	NA	18	NA	20.6
POTASSIUM	mg/L	NA	3.15 J	NA	4.64 J	NA	4.16 J	7.9	NA	NA	NA	6.12	NA	NA	4.94 J	NA	4.2 J	NA	3.97 J
SODIUM	mg/L	NA	780	NA	709	NA	756	211 J	NA	NA	NA	185	NA	NA	191	NA	208	NA	186
ANTIMONY	µg/L	NA	NA	NA	NA	NA	NA	300 U	NA	NA	NA	300 U	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	NA	NA	NA	NA	500 U	NA	NA	NA	500 U	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	NA	NA	NA	NA	10.6 J	NA	NA	NA	8.05 J	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	NA	NA	NA	NA	3 U	NA	NA	NA	3 U	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	NA	NA	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	NA	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	NA	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	NA	NA	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	NA	NA	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	NA	NA	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	NA	NA	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	NA	NA	NA	NA	750 U	NA	NA	NA	750 U	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	NA	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	NA	NA	NA	NA	400 U	NA	NA	NA	400 U	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	NA	NA	NA	NA	80 U	NA	NA	NA	80 U	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	NA	NA	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	NA	NA	NA	NA	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	NA	50 U	NA	50 U	NA	50 U	50 UJ	NA	NA	NA	50 UJ	NA	NA	50 UJ	NA	50 UJ	NA	50 U
BENZENE	µg/L	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
BROMODICHLOROMETHANE	µg/L	NA	1 U	NA	1 U	NA	1 U	0.32 J	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
BROMOFORM	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
BROMOMETHANE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
2-BUTANONE	µg/L	NA	50 U	NA	50 U	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 UJ	NA	50 UJ	NA	50 U
CARBON TETRACHLORIDE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROBENZENE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROETHANE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROFORM	µg/L	NA	1 U	NA	1 U	NA	1 U	1.3	NA	NA	NA	1.1	NA	NA	0.92 J	NA	1	NA	1
CHLOROMETHANE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
DIBROMOCHLOROMETHANE	µg/L	NA	1 U	NA	1 U	NA	1 U	0.38 J	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
1,1-DICHLOROETHANE	µg/L	NA	1 U	NA	1 U	NA	1 U	0.3 J	NA	NA	NA	0.29 J	NA	NA	0.27 J	NA	0.33 J	NA	0.31 J

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-077 MW-40-22 7/13/2005	90-131 MW-40-22 7/26/2005	90-FP-091 MW-40-22 8/9/2005	90-150 MW-40-22 8/22/2005	90-FP-105 MW-40-22 9/15/2005	90-178 MW-40-22 9/26/2005	90-022 MW-40-30 3/24/2005	90-FP-006 MW-40-30 4/4/2005	90-FP-014 MW-40-30 4/4/2005	90-FP-030 MW-40-30 4/12/2005	90-050 MW-40-30 4/27/2005	90-FP-043 MW-40-30 5/4/2005	90-FP-056 MW-40-30 5/12/2005	90-070 MW-40-30 5/25/2005	90-FP-070 MW-40-30 6/9/2005	90-100 MW-40-30 6/29/2005	90-FP-086 MW-40-30 7/14/2005	90-140 MW-40-30 7/27/2005
Analyte	**Units**																		
1,2-DICHLOROETHANE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
1,1-DICHLOROETHENE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	0.36 J	NA	0.4 J
CIS-1,2-DICHLOROETHENE	µg/L	NA	1.6	NA	1.5	NA	1.4	36	NA	NA	NA	31	NA	NA	33	NA	190	NA	130
TRANS-1,2-DICHLOROETHENE	µg/L	NA	0.3 J	NA	0.24 J	NA	1 U	0.23 J	NA	NA	NA	0.27 J	NA	NA	0.21 J	NA	1	NA	0.96 J
1,2-DICHLOROPROPANE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
ETHYLBENZENE	µg/L	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
2-HEXANONE	µg/L	NA	50 U	NA	50 U	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U
METHYL TERT-BUTYL ETHER	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
4-METHYL-2-PENTANONE	µg/L	NA	50 U	NA	50 U	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U
METHYLENE CHLORIDE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
STYRENE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
TETRACHLOROETHENE	µg/L	NA	1 U	NA	1 U	NA	1 U	120	NA	NA	NA	130	NA	NA	140	NA	19	NA	77
TOLUENE	µg/L	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.26 J	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
1,1,1-TRICHLOROETHANE	µg/L	NA	0.28 JB	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
TRICHLOROETHENE	µg/L	NA	1	NA	0.53 J	NA	0.44 J	48	NA	NA	NA	48	NA	NA	48	NA	15	NA	39
VINYL ACETATE	µg/L	NA	50 U	NA	50 U	NA	50 U	50 U	NA	NA	NA	50 UJ	NA	NA	50 U	NA	50 U	NA	50 U
VINYL CHLORIDE	µg/L	NA	1.9	NA	1	NA	1.1	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
XYLENES (TOTAL)	µg/L	NA	1 U	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	NA	7.47	NA	7.6	NA	4.44	2.14	NA	NA	NA	2.32	NA	NA	2.42	NA	3.39	NA	2.79
CHLORIDE-CL	mg/L	NA	NA	NA	NA	NA	NA	225 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	22.88	23.3	23.21	23.28	23.46	24.23	20.92	NA	21.26	21.1	20.81	21.05	20.99	21.31	21.3	21.43	21.34	21.72
ALKALINITY	mg/L	12	1020	1094	1244	1230	1240	229	NA	NA	240	208	NA	230	239	253	220	247	204
CHEMICAL OXYGEN DEMAND	mg/L	9	0	0	0	5	0	30	0	NA	21	0	7	0	0	0	19	0	0
DISSOLVED OXYGEN	mg/L	0.45	0.2	0.15	0.14	0.13	0.1	1.67	NA	0.63	0.63	0.66	0.3	0.19	0.17	0.05	0.08	0.13	0.19
IRON	mg/L	10	3	3.2	3.5	9.6	3.2	0	NA	NA	0	0	NA	0	0.2	0.4	0	0	0
NITRATE	mg/L	0	5.6	0	0	9.1	0	0.5	NA	NA	0.8	1.4	NA	0.4	6.1	2.2	4.6	2.3	1.5
SULFATE	mg/L	85	125	90	125	125	150	200	NA	NA	190	200	NA	200	200	200	90	100	200
OXIDATION REDUCTION POTENTIAL	MV	64	144	171	112	-119	-114	NA	NA	158	58	-227	-560	-557	-497	-84	23	105	122
DISSOLVED HYDROGEN	nM	NA	2.1	NA	1.4	NA	NA	1.1	NA	NA	NA	1.2	NA	NA	69000	NA	1300	NA	4.2
PH	PH_UNITS	6.69	6.78	6.66	6.82	7.01	6.76	7.63	NA	7.41	7.4	7.42	7.91	7.85	7.99	8.91	8.07	7.93	7.95
CARBON DIOXIDE	ppm	100	6	100	60	70	85	17	NA	NA	22	10	NA	10	10	10	10	10	10
SPECIFIC CONDUCTIVITY	µmhos/cm	2290	3040	3050	3070	3380	3400	1460	NA	1394	1422	1474	1371	1313	1344	1101	1281	1119	1141
HYDROGEN SULFIDE	µg/L	NA	0.633	NA	0.42 U	NA	3.1	0.42 U	NA	NA	NA	0.42 U	NA	NA	0.42 U	NA	0.42 U	NA	0.42 U
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	NA	310000	NA	270000	NA	150000	9100	NA	NA	NA	16000	NA	NA	4200	NA	2900	NA	5300
ETHANE	µg/L	NA	1.3 U	NA	1.3 U	NA	1.3 U	1.3 U	NA	NA	NA	1.3 U	NA	NA	0.67 J	NA	2	NA	1.3 J
ETHENE	µg/L	NA	1.3	NA	0.92 J	NA	0.81 J	1.2 J	NA	NA	NA	1.4	NA	NA	1.4	NA	2.4	NA	2.6
METHANE	µg/L	NA	11000	NA	8800	NA	11000	2.7	NA	NA	NA	1 J	NA	NA	1700	NA	1600	NA	1200

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number **Sample Location** **Sample Date**		**90-FP-098** **MW-40-30** **8/10/2005**	**90-166** **MW-40-30** **8/24/2005**	**90-FP-113** **MW-40-30** **9/16/2005**	**90-190** **MW-40-30** **9/28/2005**	**90-020** **MW-40-31** **3/24/2005**	**90-021 (FD)** **MW-40-31** **3/24/2005**	**90-FP-015** **MW-40-31** **4/4/2005**	**90-FP-029** **MW-40-31** **4/12/2005**	**90-051** **MW-40-31** **4/27/2005**	**90-FP-055** **MW-40-31** **5/12/2005**	**90-071** **MW-40-31** **5/25/2005**	**90-FP-071** **MW-40-31** **6/9/2005**	**90-117** **MW-40-31** **7/1/2005**	**90-FP-087** **MW-40-31** **7/14/2005**
Analyte	**Units**														
Residue, Filterable (EPA Method 160.1)															
TDS	mg/L	NA	845	NA	885	8010	NA	NA	NA	11200	NA	12100	NA	10500	NA
Ion Chromatography (EPA Method 300.0)															
CHLORIDE	mg/L	NA	184	NA	173	NA	NA	NA	NA	2610	NA	2040	NA	1890	NA
NITRATE AS N	mg/L	NA	0.1 U	NA	0.346	NA	NA	NA	NA	0.1 U	NA	0.1 UJ	NA	1.02	NA
NITRITE AS N	mg/L	NA	0.1 U	NA	0.1 U	NA	NA	NA	NA	0.1 U	NA	0.1 UJ	NA	NA	NA
SULFATE	mg/L	NA	130	NA	137	NA	NA	NA	NA	283	NA	29.4	NA	7.21	NA
Total Alkalinity (EPA Method 310.1)															
ALKALINITY	mg/L	NA	274	NA	289	145	NA	NA	NA	2210	NA	3450	NA	1730	NA
Nitrogen as Nitrate (EPA Method 353.3)															
NITRATE-N	mg/L	NA	NA	NA	NA	0.419	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)															
NITRITE AS N	mg/L	NA	NA	NA	NA	0.027	NA	NA	NA	NA	NA	NA	NA	0.053 J	NA
SULFATE	mg/L	NA	NA	NA	NA	513	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	NA	77.7	NA	10 U	130	NA	NA	NA	302	NA	545	NA	469	NA
Metals (EPA Method 6010B)															
CALCIUM	mg/L	NA	83.9	NA	88.6	620	NA	NA	NA	936	NA	965	NA	1100	NA
IRON	mg/L	NA	0.0614 J	NA	0.366	0.0674 J	NA	NA	NA	11.8	NA	31.1	NA	52.9	NA
MAGNESIUM	mg/L	NA	22	NA	24.1	292	NA	NA	NA	402	NA	411	NA	417	NA
POTASSIUM	mg/L	NA	5.38	NA	3.84 J	13.4	NA	NA	NA	12.2	NA	11.5	NA	11.2	NA
SODIUM	mg/L	NA	185	NA	197	1130 J	NA	NA	NA	1300	NA	1620	NA	1700	NA
ANTIMONY	µg/L	NA	NA	NA	NA	300 U	NA	NA	NA	300 U	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	NA	NA	500 U	NA	NA	NA	23.2 J	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	NA	NA	255	NA	NA	NA	582	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	NA	NA	3 U	NA	NA	NA	3 U	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	NA	NA	70 U	NA	NA	NA	19.1 J	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	NA	NA	750 U	NA	NA	NA	750 U	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	NA	NA	400 U	NA	NA	NA	400 U	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	NA	NA	80 U	NA	NA	NA	18.3 J	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)															
MERCURY	µg/L	NA	NA	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)															
ACETONE	µg/L	NA	50 U	NA	50 U	50 UJ	50 UJ	NA	NA	22 J	NA	40 J	NA	88 J	NA
BENZENE	µg/L	NA	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
BROMODICHLOROMETHANE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
BROMOFORM	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
BROMOMETHANE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
2-BUTANONE	µg/L	NA	50 U	NA	50 U	50 U	50 U	NA	NA	23 J	NA	240 J	NA	560 J	NA
CARBON TETRACHLORIDE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
CHLOROBENZENE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
CHLOROETHANE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
CHLOROFORM	µg/L	NA	0.83 J	NA	0.72 J	0.65 J	0.46 J	NA	NA	3.6	NA	2.4	NA	0.6 J	NA
CHLOROMETHANE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
DIBROMOCHLOROMETHANE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
1,1-DICHLOROETHANE	µg/L	NA	0.26 J	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-FP-098	90-166	90-FP-113	90-190	90-020	90-021 (FD)	90-FP-015	90-FP-029	90-051	90-FP-055	90-071	90-FP-071	90-117	90-FP-087
Sample Location		MW-40-30	MW-40-30	MW-40-30	MW-40-30	MW-40-31	MW-40-31	MW-40-31	MW-40-31	MW-40-31	MW-40-31	MW-40-31	MW-40-31	MW-40-31	MW-40-31
Sample Date		8/10/2005	8/24/2005	9/16/2005	9/28/2005	3/24/2005	3/24/2005	4/4/2005	4/12/2005	4/27/2005	5/12/2005	5/25/2005	6/9/2005	7/1/2005	7/14/2005
Analyte	**Units**														
1,2-DICHLOROETHANE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
1,1-DICHLOROETHENE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
CIS-1,2-DICHLOROETHENE	µg/L	NA	81	NA	45	0.49 J	0.39 J	NA	NA	5.2	NA	8.4	NA	13	NA
TRANS-1,2-DICHLOROETHENE	µg/L	NA	0.68 J	NA	0.28 J	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
1,2-DICHLOROPROPANE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
CIS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
TRANS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
ETHYLBENZENE	µg/L	NA	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
2-HEXANONE	µg/L	NA	50 U	NA	50 U	50 U	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA
METHYL TERT-BUTYL ETHER	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
4-METHYL-2-PENTANONE	µg/L	NA	50 U	NA	50 U	50 U	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA
METHYLENE CHLORIDE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1.3	NA	2.5	NA
STYRENE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
1,1,2,2-TETRACHLOROETHANE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
TETRACHLOROETHENE	µg/L	NA	92	NA	160	6	4.6	NA	NA	24	NA	31	NA	32	NA
TOLUENE	µg/L	NA	0.5 U	NA	0.5 U	0.22 J	0.5 U	NA	NA	0.5 U	NA	0.61	NA	0.68	NA
1,1,2-TRICHLOROETHANE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
1,1,1-TRICHLOROETHANE	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
TRICHLOROETHENE	µg/L	NA	34	NA	42	0.71 J	0.53 J	NA	NA	3.2	NA	4.6	NA	4.8	NA
VINYL ACETATE	µg/L	NA	50 U	NA	50 U	50 U	50 U	NA	NA	50 UJ	NA	50 U	NA	50 U	NA
VINYL CHLORIDE	µg/L	NA	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
XYLENES (TOTAL)	µg/L	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA
TOC (EPA Method 9060)															
TOTAL ORGANIC CARBON	mg/L	NA	2.72	NA	3.58	1.14	NA	NA	NA	2030	NA	2850	NA	2800	NA
CHLORIDE-CL	mg/L	NA	NA	NA	NA	2950 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements															
TEMPERATURE	C	21.57	21.73	21.73	21.7	21.08	NA	21.28	21.4	21.18	21.18	21.98	21.82	21.96	21.83
ALKALINITY	mg/L	229	NA	250	260	123	NA	NA	230	1090	2335	1850	2970	2130	2110
CHEMICAL OXYGEN DEMAND	mg/L	0	NA	4	0	73	NA	NA	380	1602	1764	3296	3150	3780	2628
DISSOLVED OXYGEN	mg/L	0.15	0.17	0.14	0.13	0.55	NA	0.55	0.31	0.07	0.27	0.29	0.17	0.15	0.18
IRON	mg/L	0	NA	0	0	0	NA	NA	0.9	4.5	6.6	8.8	8.4	8.8	5.8
NITRATE	mg/L	0.8	NA	1.7	1.3	0.3	NA	NA	2.4	3.9	35	735	27.5	35	34.3
SULFATE	mg/L	200	NA	200	200	200	NA	NA	200	52	50	0	200	50	50
OXIDATION REDUCTION POTENTIAL	MV	247	218	45	16	NA	NA	160	-273	-281	-205	-129	-13	43	76
DISSOLVED HYDROGEN	nM	NA	0.96	NA	NA	1.9	NA	NA	NA	170	NA	13000	NA	3.4	NA
PH	PH_UNITS	7.73	7.1	6.75	6.65	7.09	NA	7.07	6.78	6.78	6.43	6.16	6.36	6	6.35
CARBON DIOXIDE	ppm	10	NA	27	40	20	NA	NA	50	210	275	550	300	425	400
SPECIFIC CONDUCTIVITY	µmhos/cm	1201	1231	1456	1423	10640	NA	9650	10600	11760	10530	11160	9486	9480	9540
HYDROGEN SULFIDE	µg/L	NA	0.42 U	NA	1.11	0.42 U	NA	NA	NA	0.967	NA	14.7	NA	1.44	NA
Dissolved Gases (Method RSK-175)															
CARBON DIOXIDE	µg/L	NA	27000	NA	78000	12000	NA	NA	NA	770000	NA	1500000	NA	970000	NA
ETHANE	µg/L	NA	0.85 J	NA	1.3 U	1.3 U	NA	NA	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA
ETHENE	µg/L	NA	1.4	NA	1.5	0.75 J	NA	NA	NA	1 J	NA	1.5	NA	1.7	NA
METHANE	µg/L	NA	6100	NA	13000	2.9	NA	NA	NA	60	NA	72	NA	110	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-141 MW-40-31 7/27/2005	90-142 (FD) MW-40-31 7/27/2005	90-FP-099 MW-40-31 8/10/2005	90-167 MW-40-31 8/24/2005	90-FP-114 MW-40-31 9/16/2005	90-191 MW-40-31 9/28/2005	90-192 (FD) MW-40-31 9/28/2005	90-019 MW-40-32 3/24/2005	90-FP-016 MW-40-32 4/4/2005	90-FP-031 MW-40-32 4/12/2005	90-052 MW-40-32 4/27/2005	90-FP-057 MW-40-32 5/12/2005	90-072 MW-40-32 5/25/2005	90-FP-072 MW-40-32 6/9/2005	90-101 MW-40-32 6/29/2005	90-102 (FD) MW-40-32 6/29/2005	90-FP-088 MW-40-32 7/14/2005	90-143 MW-40-32 7/27/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	10400	NA	NA	10800	NA	11000	NA	875	NA	NA	795	NA	956	NA	875	NA	NA	845
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	1820	NA	NA	1520	NA	1520	NA	NA	NA	NA	207	NA	202	NA	164	NA	NA	161
NITRATE AS N	mg/L	0.99	NA	NA	1 U	NA	0.1 U	NA	NA	NA	NA	1.7	NA	0.1 UJ	NA	0.1 U	NA	NA	0.1 U
NITRITE AS N	mg/L	0.5 U	NA	NA	1 U	NA	0.1 U	NA	NA	NA	NA	0.1 U	NA	0.1 UJ	NA	0.1 U	NA	NA	0.1 U
SULFATE	mg/L	1.81	NA	NA	0.469 J	NA	0.5 U	NA	NA	NA	NA	130	NA	104	NA	0.986	NA	NA	1.97
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	3330	NA	NA	3510	NA	3660	NA	211	NA	NA	231	NA	220	NA	380	NA	NA	387
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	NA	NA	NA	NA	NA	1.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																			
NITRITE AS N	mg/L	NA	NA	NA	NA	NA	NA	NA	0.274	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	NA	NA	NA	NA	119	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	1430	NA	NA	7100	NA	5920	NA	19.8	NA	NA	10 U	NA	231	NA	153	NA	NA	84.3
Metals (EPA Method 6010B)																			
CALCIUM	mg/L	1060	NA	NA	1260	NA	1370	NA	70.4	NA	NA	74.9	NA	79.1	NA	88.9	NA	NA	97.2
IRON	mg/L	67.7	NA	NA	105	NA	140	NA	0.052 J	NA	NA	0.1 U	NA	1.09	NA	0.239	NA	NA	1.56
MAGNESIUM	mg/L	391	NA	NA	406	NA	393	NA	26.2	NA	NA	26.7	NA	27	NA	29	NA	NA	30.8
POTASSIUM	mg/L	11.3	NA	NA	11.7	NA	11	NA	9.4	NA	NA	9.1	NA	7.57	NA	5.53	NA	NA	3.59 J
SODIUM	mg/L	1430	NA	NA	1530	NA	3090	NA	186 J	NA	NA	174	NA	164	NA	166	NA	NA	154
ANTIMONY	µg/L	NA	NA	NA	NA	NA	NA	NA	300 U	NA	NA	300 U	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	NA	NA	NA	NA	NA	500 U	NA	NA	500 U	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	22.2	NA	NA	16 J	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	3 U	NA	NA	3 U	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	40 U	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	NA	NA	NA	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	NA	NA	NA	NA	NA	60 U	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	NA	NA	NA	NA	NA	40 U	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	NA	NA	NA	NA	NA	50 U	NA	NA	23.3 J	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	NA	NA	NA	NA	NA	50 U	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	750 U	NA	NA	750 U	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	NA	NA	NA	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	400 U	NA	NA	400 U	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	80 U	NA	NA	80 U	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	NA	NA	NA	NA	NA	20 U	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	NA	NA	NA	NA	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	58	67	NA	52	NA	110	110	50 UJ	NA	NA	50 UJ	NA	50 UJ	NA	50 UJ	50 UJ	NA	50 U
BENZENE	µg/L	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U
BROMODICHLOROMETHANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	0.98 J	NA	NA	0.33 J	NA	1 U	NA	1 U	1 U	NA	1 U
BROMOFORM	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
BROMOMETHANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
2-BUTANONE	µg/L	340 J	340 J	NA	300 J	NA	340	300	50 U	NA	NA	50 U	NA	50 UJ	NA	24 J	23 J	NA	6.2 J
CARBON TETRACHLORIDE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
CHLOROBENZENE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
CHLOROETHANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
CHLOROFORM	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	2.2	NA	NA	1.4	NA	0.47 J	NA	1 U	1 U	NA	1 U
CHLOROMETHANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
DIBROMOCHLOROMETHANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	0.82 J	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
1,1-DICHLOROETHANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	0.25 J	NA	NA	0.44 J	NA	0.37 J	NA	0.38 J	0.39 J	NA	0.34 J

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-141 MW-40-31 7/27/2005	90-142 (FD) MW-40-31 7/27/2005	90-FP-099 MW-40-31 8/10/2005	90-167 MW-40-31 8/24/2005	90-FP-114 MW-40-31 9/16/2005	90-191 MW-40-31 9/28/2005	90-192 (FD) MW-40-31 9/28/2005	90-019 MW-40-32 3/24/2005	90-FP-016 MW-40-32 4/4/2005	90-FP-031 MW-40-32 4/12/2005	90-052 MW-40-32 4/27/2005	90-FP-057 MW-40-32 5/12/2005	90-072 MW-40-32 5/25/2005	90-FP-072 MW-40-32 6/9/2005	90-101 MW-40-32 6/29/2005	90-102 (FD) MW-40-32 6/29/2005	90-FP-088 MW-40-32 7/14/2005	90-143 MW-40-32 7/27/2005
Analyte	**Units**																		
1,2-DICHLOROETHANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
1,1-DICHLOROETHENE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	0.32 J
CIS-1,2-DICHLOROETHENE	µg/L	13	14	NA	18	NA	13	14	31	NA	NA	40	NA	54	NA	150	150	NA	130
TRANS-1,2-DICHLOROETHENE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	0.56 J	NA	0.26 J	NA	0.68 J	0.79 J	NA	0.81 J
1,2-DICHLOROPROPANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
ETHYLBENZENE	µg/L	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U
2-HEXANONE	µg/L	50 U	50 U	NA	50 U	NA	50 U	50 U	50 U	NA	NA	50 U	NA	50 U	NA	50 U	50 U	NA	50 U
METHYL TERT-BUTYL ETHER	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
4-METHYL-2-PENTANONE	µg/L	50 U	50 U	NA	50 U	NA	50 U	50 U	50 U	NA	NA	50 U	NA	50 U	NA	50 U	50 U	NA	50 U
METHYLENE CHLORIDE	µg/L	2.5	2.8	NA	3.2	NA	2.2	2.3	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
STYRENE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
TETRACHLOROETHENE	µg/L	14	16	NA	0.59 J	NA	1 U	1 U	58	NA	NA	73	NA	110	NA	4	3.8	NA	2.1
TOLUENE	µg/L	0.42 J	0.46 J	NA	0.46 J	NA	0.79	0.85	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
1,1,1-TRICHLOROETHANE	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
TRICHLOROETHENE	µg/L	4	4.5	NA	0.95 J	NA	0.34 J	0.37 J	28	NA	NA	36	NA	48	NA	1.9	2	NA	0.84 J
VINYL ACETATE	µg/L	50 U	50 U	NA	50 U	NA	50 U	50 U	50 U	NA	NA	50 UJ	NA	50 U	NA	50 U	50 U	NA	50 U
VINYL CHLORIDE	µg/L	0.5 U	0.5 U	NA	0.28 J	NA	2.6	2.9	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U
XYLENES (TOTAL)	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	34.4	NA	NA	2550	NA	2700	NA	2.4	NA	NA	2.82	NA	75.1	NA	60.2	NA	NA	34.3
CHLORIDE-CL	mg/L	NA	NA	NA	NA	NA	NA	NA	210 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	22.51	NA	22.06	22.31	22.08	22.32	NA	20.29	20.8	18.51	20.63	20.25	20.96	20.68	21.12	NA	20.86	21.41
ALKALINITY	mg/L	2010	NA	1480	NA	2280	2580	NA	189	NA	180	186	234	157	260	210	NA	312	362
CHEMICAL OXYGEN DEMAND	mg/L	2880	NA	2286	NA	3960	3618	NA	17	NA	9	21	0	17	25	41	NA	16	27
DISSOLVED OXYGEN	mg/L	0.24	NA	0.15	0.17	0.16	0.09	NA	1.09	0.9	0.89	0.97	0.17	0.2	0.03	0.06	NA	0.06	0.12
IRON	mg/L	7	NA	3.9	NA	7.6	7	NA	0	NA	0	0	0	0.8	0	0	NA	0.6	0.7
NITRATE	mg/L	35	NA	32.5	NA	2.4	0	NA	0.5	NA	0.4	0.6	0.4	1.4	2.5	1	NA	4.2	1.2
SULFATE	mg/L	50	NA	20	NA	52	50	NA	200	NA	200	200	175	180	180	50	NA	50	50
OXIDATION REDUCTION POTENTIAL	MV	89	NA	200	174	-105	-116	NA	NA	161	106	266	-857	-413	-246	16	NA	94	114
DISSOLVED HYDROGEN	nM	4.9	NA	NA	1.4	NA	NA	NA	1.4	NA	NA	5.4	NA	20000	NA	23	NA	NA	4.6
PH	PH_UNITS	6.6	NA	6.4	6.52	6.42	6.23	NA	7.65	7.63	7.65	7.56	7.54	6.52	8.58	7.45	NA	7.22	7.27
CARBON DIOXIDE	ppm	875	NA	625	NA	500	1860	NA	15	NA	27	10	11	20	10	12	NA	15	23
SPECIFIC CONDUCTIVITY	µmhos/cm	9490	NA	9570	9700	10970	11010	NA	1450	1361	1481	1436	1253	1317	1090	1255	NA	1100	1154
HYDROGEN SULFIDE	µg/L	0.42 U	NA	NA	0.84 U	NA	0.42 U	NA	0.42 U	NA	NA	0.42 U	NA	0.42 U	NA	0.42 U	NA	NA	0.42 U
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	890000	NA	NA	750000	NA	780000	NA	7300	NA	NA	8600	NA	59000	NA	14000	NA	NA	36000
ETHANE	µg/L	1.3 U	NA	NA	1.3 U	NA	1.3 U	NA	1.4	NA	NA	0.77 J	NA	1.3 U	NA	1.3 U	NA	NA	1.3 U
ETHENE	µg/L	1.8	NA	NA	1.4	NA	0.92 J	NA	1.7	NA	NA	0.8 J	NA	1.2 U	NA	0.98 J	NA	NA	1.1 J
METHANE	µg/L	220	NA	NA	840	NA	11000	NA	12	NA	NA	1.2 J	NA	370	NA	130	NA	NA	4900

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-100 MW-40-32 8/10/2005	90-168 MW-40-32 8/24/2005	90-FP-115 MW-40-32 9/16/2005	90-193 MW-40-32 9/28/2005	90-010 MW-40-33 3/23/2005	90-FP-001 MW-40-33 4/4/2005	90-FP-010 MW-40-33 4/4/2005	90-FP-022 MW-40-33 4/11/2005	90-044 MW-40-33 4/26/2005	90-FP-039 MW-40-33 5/4/2005	90-FP-048 MW-40-33 5/10/2005	90-064 MW-40-33 5/24/2005	90-FP-066 MW-40-33 6/9/2005	90-091 MW-40-33 6/27/2005	90-FP-079 MW-40-33 7/13/2005	90-133 MW-40-33 7/26/2005	90-FP-093 MW-40-33 8/9/2005	90-152 MW-40-33 8/22/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	NA	875	NA	865	365	NA	NA	NA	270	NA	NA	310	NA	320	NA	430	NA	380
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	NA	161	NA	156	NA	NA	NA	NA	50.5	NA	NA	52 J	NA	30	NA	98.9	NA	88.8
NITRATE AS N	mg/L	NA	0.1 U	NA	0.1 U	NA	NA	NA	NA	1.47	NA	NA	1.46	NA	0.861	NA	0.104	NA	0.505
NITRITE AS N	mg/L	NA	0.1 U	NA	0.1 U	NA	NA	NA	NA	0.1 U	NA	NA	0.1 U	NA	0.118	NA	0.1 U	NA	0.1 U
SULFATE	mg/L	NA	2.04	NA	31.3	NA	NA	NA	NA	54.2	NA	NA	56.7	NA	30.6	NA	72.2	NA	73.9
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	NA	460	NA	528	118	NA	NA	NA	110	NA	NA	100	NA	83	NA	100	NA	95.3
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	NA	NA	2.13 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																			
NITRITE AS N	mg/L	NA	NA	NA	NA	0.089	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	NA	210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	NA	85.8	NA	10 U	10 U	NA	NA	NA	10 U	NA	NA	10 U	NA	10 U	NA	10 U	NA	24.9
Metals (EPA Method 6010B)																			
CALCIUM	mg/L	NA	104	NA	120	19.3	NA	NA	NA	19.1	NA	NA	19	NA	24.3	NA	40.6	NA	34.6
IRON	mg/L	NA	5.12	NA	10.5	0.0515 J	NA	NA	NA	0.1 U	NA	NA	0.1 U	NA	0.0488 J	NA	0.1 U	NA	0.1 U
MAGNESIUM	mg/L	NA	31.2	NA	35.6	6.68	NA	NA	NA	5.69	NA	NA	6.06	NA	7.3	NA	10.9	NA	9.43
POTASSIUM	mg/L	NA	5.78	NA	3.19 J	2.9 J	NA	NA	NA	2.23 J	NA	NA	5 U	NA	2.23 J	NA	2.26 J	NA	2.06 J
SODIUM	mg/L	NA	149	NA	169	95.3	NA	NA	NA	69.2	NA	NA	74.6	NA	83.9	NA	99.4	NA	88.9
ANTIMONY	µg/L	NA	NA	NA	NA	300 U	NA	NA	NA	300 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	NA	NA	10.7 J	NA	NA	NA	500 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	NA	NA	5.64 J	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	NA	NA	3 U	NA	NA	NA	3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	NA	NA	23.2 J	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	NA	NA	750 U	NA	NA	NA	750 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	NA	NA	400 U	NA	NA	NA	400 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	NA	NA	14.4 J	NA	NA	NA	11.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	NA	NA	NA	NA	0.12 J	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	NA	50 U	NA	50 U	50 UJ	NA	NA	NA	50 UJ	NA	NA	50 UJ	NA	50 UJ	NA	50 U	NA	50 U
BENZENE	µg/L	NA	0.5 U	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
BROMODICHLOROMETHANE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
BROMOFORM	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
BROMOMETHANE	µg/L	NA	0.28 J	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
2-BUTANONE	µg/L	NA	50 U	NA	50 U	50 UJ	NA	NA	NA	50 UJ	NA	NA	50 UJ	NA	50 UJ	NA	50 U	NA	50 U
CARBON TETRACHLORIDE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
CHLOROBENZENE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
CHLOROETHANE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
CHLOROFORM	µg/L	NA	0.41 J	NA	0.37 J	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
CHLOROMETHANE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
DIBROMOCHLOROMETHANE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
1,1-DICHLOROETHANE	µg/L	NA	0.31 J	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-100 MW-40-32 8/10/2005	90-168 MW-40-32 8/24/2005	90-FP-115 MW-40-32 9/16/2005	90-193 MW-40-32 9/28/2005	90-010 MW-40-33 3/23/2005	90-FP-001 MW-40-33 4/4/2005	90-FP-010 MW-40-33 4/4/2005	90-FP-022 MW-40-33 4/11/2005	90-044 MW-40-33 4/26/2005	90-FP-039 MW-40-33 5/4/2005	90-FP-048 MW-40-33 5/10/2005	90-064 MW-40-33 5/24/2005	90-FP-066 MW-40-33 6/9/2005	90-091 MW-40-33 6/27/2005	90-FP-079 MW-40-33 7/13/2005	90-133 MW-40-33 7/26/2005	90-FP-093 MW-40-33 8/9/2005	90-152 MW-40-33 8/22/2005
Analyte	**Units**																		
1,2-DICHLOROETHANE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
1,1-DICHLOROETHENE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
CIS-1,2-DICHLOROETHENE	µg/L	NA	160	NA	120	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
TRANS-1,2-DICHLOROETHENE	µg/L	NA	2.4	NA	0.5 J	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
1,2-DICHLOROPROPANE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
ETHYLBENZENE	µg/L	NA	0.5 U	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
2-HEXANONE	µg/L	NA	50 U	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U
METHYL TERT-BUTYL ETHER	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
4-METHYL-2-PENTANONE	µg/L	NA	50 U	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U
METHYLENE CHLORIDE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
STYRENE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
TETRACHLOROETHENE	µg/L	NA	1.7	NA	1.5	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
TOLUENE	µg/L	NA	0.5 U	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
1,1,1-TRICHLOROETHANE	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	0.28 JB	NA	1 U
TRICHLOROETHENE	µg/L	NA	1.6	NA	0.94 J	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
VINYL ACETATE	µg/L	NA	50 U	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U
VINYL CHLORIDE	µg/L	NA	9.6	NA	9.5	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
XYLENES (TOTAL)	µg/L	NA	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	NA	14	NA	4.52	2.66	NA	NA	NA	3.51	NA	NA	2.89	NA	2.93	NA	3.26	NA	3.42
CHLORIDE-CL	mg/L	NA	NA	NA	NA	75	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	21.15	21.6	21.37	21.67	20.22	NA	20.51	20.4	20.08	20.16	20.13	20.37	20.31	21.05	20.58	21.04	20.94	21.9
ALKALINITY	mg/L	364	NA	446	448	120	NA	NA	72	78	NA	103	85	118	125	85	110	72	74
CHEMICAL OXYGEN DEMAND	mg/L	0	NA	0	20	8	0	NA	32	0	5	0	0	0	17	0	0	0	2
DISSOLVED OXYGEN	mg/L	0.07	0.1	0.11	0.1	1.04	NA	0.39	0.49	0.36	0.36	0.28	0.32	0.14	0.1	0.22	0.2	0.17	0.17
IRON	mg/L	0.8	NA	7.4	3	0.2	NA	NA	0	0	NA	0	0	0	0	0	0	0	0
NITRATE	mg/L	3.3	NA	1	0.5	2	NA	NA	2.2	1	NA	2.3	2	1.7	2.8	0.7	1.1	0.6	0.6
SULFATE	mg/L	50	NA	50	52	100	NA	NA	80	75	NA	95	80	85	75	75	100	100	100
OXIDATION REDUCTION POTENTIAL	MV	205	219	-160	-51	-856	NA	88	14	-298	94	100	197	-20	116	102	164	195	151
DISSOLVED HYDROGEN	nM	NA	1.3	NA	NA	1.2	NA	NA	NA	15	NA	NA	2.1	NA	1900	NA	1900	NA	25
PH	PH_UNITS	7.07	6.22	6.64	6.34	8.13	NA	7.87	7.88	7.7	8.4	7.63	7.66	8.09	6.62	7.78	7.51	7.54	7.66
CARBON DIOXIDE	ppm	15	NA	40	90	10	NA	NA	15	10	NA	10	10	40	10	10	10	10	10
SPECIFIC CONDUCTIVITY	µmhos/cm	1169	1254	1490	1464	611	NA	534	481	490	511	497	469	418	498	434	444	431	503
HYDROGEN SULFIDE	µg/L	NA	0.42 U	NA	0.42 U	0.42 U	NA	NA	NA	0.42 U	NA	NA	0.42 U	NA	0.42 U	NA	0.42 U	NA	0.42 U
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	NA	240000	NA	240000	2000	NA	NA	NA	1900	NA	NA	1600	NA	2500	NA	3100	NA	3600
ETHANE	µg/L	NA	1.3 U	NA	1.3 U	1.3 U	NA	NA	NA	1.3 U	NA	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA	1.3 U
ETHENE	µg/L	NA	0.84 J	NA	1.2 U	1.2 U	NA	NA	NA	1.2 U	NA	NA	1.2 U	NA	0.69 J	NA	1.2 U	NA	1.2 U
METHANE	µg/L	NA	7900	NA	12000	1.8	NA	NA	NA	1.5	NA	NA	1.7	NA	3.2	NA	4.6	NA	1.9

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		**90-FP-107**	**90-184**	**90-009**	**90-FP-002**	**90-FP-011**	**90-FP-023**	**90-045**	**90-FP-040**	**90-FP-049**	**90-065**	**90-FP-067**	**90-094**	**90-FP-080**	**90-134**
Sample Location		**MW-40-33**	**MW-40-33**	**MW-40-34**	**MW-40-34**	**MW-40-34**	**MW-40-34**	**MW-40-34**	**MW-40-34**	**MW-40-34**	**MW-40-34**	**MW-40-34**	**MW-40-34**	**MW-40-34**	**MW-40-34**
Sample Date		**9/15/2005**	**9/27/2005**	**3/23/2005**	**4/4/2005**	**4/4/2005**	**4/11/2005**	**4/26/2005**	**5/4/2005**	**5/10/2005**	**5/24/2005**	**6/9/2005**	**6/28/2005**	**7/13/2005**	**7/26/2005**
Analyte	**Units**														
Residue, Filterable (EPA Method 160.1)															
TDS	mg/L	NA	470	685	NA	NA	NA	1330	NA	NA	1330	NA	1210	NA	880
Ion Chromatography (EPA Method 300.0)															
CHLORIDE	mg/L	NA	111	NA	NA	NA	NA	331	NA	NA	330 J	NA	192	NA	231
NITRATE AS N	mg/L	NA	1.46	NA	NA	NA	NA	3.27	NA	NA	0.62	NA	0.1 U	NA	0.5 U
NITRITE AS N	mg/L	NA	0.179	NA	NA	NA	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U	NA	0.5 U
SULFATE	mg/L	NA	85.1	NA	NA	NA	NA	217	NA	NA	229	NA	72.7	NA	64.9
Total Alkalinity (EPA Method 310.1)															
ALKALINITY	mg/L	NA	112	223	NA	NA	NA	306	NA	NA	308	NA	426	NA	486
Nitrogen as Nitrate (EPA Method 353.3)															
NITRATE-N	mg/L	NA	NA	3.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)															
NITRITE AS N	mg/L	NA	NA	0.262	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	158	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	NA	10 U	10 U	NA	NA	NA	14.6	NA	NA	10 U	NA	290	NA	10 U
Metals (EPA Method 6010B)															
CALCIUM	mg/L	NA	46.9	24.1	NA	NA	NA	112	NA	NA	112	NA	107	NA	97.9
IRON	mg/L	NA	0.1 U	0.453	NA	NA	NA	0.1 U	NA	NA	0.152	NA	6.2	NA	1.57
MAGNESIUM	mg/L	NA	12.3	11.8	NA	NA	NA	27.6	NA	NA	28.4	NA	29.4	NA	25.4
POTASSIUM	mg/L	NA	2.11 J	8.53	NA	NA	NA	4.49 J	NA	NA	4.57 J	NA	4.32 J	NA	3.77 J
SODIUM	mg/L	NA	100	216	NA	NA	NA	243	NA	NA	272	NA	306	NA	282
ANTIMONY	µg/L	NA	NA	300 U	NA	NA	NA	300 U	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	10.5 J	NA	NA	NA	500 U	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	5.62 J	NA	NA	NA	22	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	3 U	NA	NA	NA	3 U	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	35.5 J	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	750 U	NA	NA	NA	750 U	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	400 U	NA	NA	NA	400 U	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	16.4 J	NA	NA	NA	80 U	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)															
MERCURY	µg/L	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)															
ACETONE	µg/L	NA	50 U	50 UJ	NA	NA	NA	50 UJ	NA	NA	50 UJ	NA	50 UJ	NA	50 U
BENZENE	µg/L	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
BROMODICHLOROMETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
BROMOFORM	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
BROMOMETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
2-BUTANONE	µg/L	NA	50 U	50 UJ	NA	NA	NA	50 UJ	NA	NA	50 UJ	NA	140 J	NA	35 J
CARBON TETRACHLORIDE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROBENZENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROFORM	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
CHLOROMETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
DIBROMOCHLOROMETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
1,1-DICHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-107 MW-40-33 9/15/2005	90-184 MW-40-33 9/27/2005	90-009 MW-40-34 3/23/2005	90-FP-002 MW-40-34 4/4/2005	90-FP-011 MW-40-34 4/4/2005	90-FP-023 MW-40-34 4/11/2005	90-045 MW-40-34 4/26/2005	90-FP-040 MW-40-34 5/4/2005	90-FP-049 MW-40-34 5/10/2005	90-065 MW-40-34 5/24/2005	90-FP-067 MW-40-34 6/9/2005	90-094 MW-40-34 6/28/2005	90-FP-080 MW-40-34 7/13/2005	90-134 MW-40-34 7/26/2005
Analyte	**Units**														
1,2-DICHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
1,1-DICHLOROETHENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	0.32 J
CIS-1,2-DICHLOROETHENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	0.24 J	NA	130	NA	130
TRANS-1,2-DICHLOROETHENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	0.59 J	NA	0.84 J
1,2-DICHLOROPROPANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
ETHYLBENZENE	µg/L	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
2-HEXANONE	µg/L	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U
METHYL TERT-BUTYL ETHER	µg/L	NA	1 U	0.24 J	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
4-METHYL-2-PENTANONE	µg/L	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U
METHYLENE CHLORIDE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
STYRENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
TETRACHLOROETHENE	µg/L	NA	1 U	9.1	NA	NA	NA	140	NA	NA	180	NA	5.8	NA	6.8
TOLUENE	µg/L	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.21 J	NA	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
1,1,1-TRICHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	0.28 JB
TRICHLOROETHENE	µg/L	NA	1 U	1 U	NA	NA	NA	1.2	NA	NA	1.6	NA	1.3	NA	2.1
VINYL ACETATE	µg/L	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U
VINYL CHLORIDE	µg/L	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
XYLENES (TOTAL)	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U
TOC (EPA Method 9060)															
TOTAL ORGANIC CARBON	mg/L	NA	4.79	3.42	NA	NA	NA	2.35	NA	NA	2.53	NA	101	NA	19.1
CHLORIDE-CL	mg/L	NA	NA	185	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements															
TEMPERATURE	C	21.09	21.03	21.06	NA	21.77	21.76	21.58	21.51	21.67	21.69	21.45	21.76	21.99	22.62
ALKALINITY	mg/L	43	112	223	NA	NA	279	295	NA	263	311	2.81	195	326	403
CHEMICAL OXYGEN DEMAND	mg/L	7	4	16	0	NA	20	0	0	0	0	13	45	157	0
DISSOLVED OXYGEN	mg/L	0.19	0.2	0.95	NA	0.27	0.5	0.16	0.32	0.23	0.2	0.07	0.11	0.23	0.23
IRON	mg/L	0	0	0	NA	NA	0	0	NA	0	0.6	0	2.1	2.5	0
NITRATE	mg/L	2.1	9.3	0	NA	NA	0.6	1.4	NA	1	1.2	6.6	0	0.2	0.2
SULFATE	mg/L	150	150	175	NA	NA	200	200	NA	200	200	200	175	95	100
OXIDATION REDUCTION POTENTIAL	MV	-35	-103	-743	NA	125	74	-299	134	-190	-553	-243	34	-26	-101
DISSOLVED HYDROGEN	nM	NA	NA	1.2	NA	NA	NA	1.8	NA	NA	26000	NA	2.6	NA	66
PH	PH_UNITS	8.03	7.69	8.09	NA	7.42	7.35	7.14	7.76	7.18	7	7.37	6.78	6.55	6.78
CARBON DIOXIDE	ppm	10	16	11	NA	NA	17	10	NA	16	11	15	35	23	75
SPECIFIC CONDUCTIVITY	µmhos/cm	590	572	1180	NA	1580	1710	2040	1870	1780	1740	1119	1610	1460	1452
HYDROGEN SULFIDE	µg/L	NA	0.42 U	0.42 U	NA	NA	NA	0.42 U	NA	NA	0.42 U	NA	1.35	NA	333
Dissolved Gases (Method RSK-175)															
CARBON DIOXIDE	µg/L	NA	6300	5100	NA	NA	NA	31000	NA	NA	36000	NA	170000	NA	82000
ETHANE	µg/L	NA	1.3 U	1.3 U	NA	NA	NA	1.3 U	NA	NA	1.3 U	NA	1.9	NA	1 J
ETHENE	µg/L	NA	1.2 U	1.2 U	NA	NA	NA	1.2 U	NA	NA	1.2 U	NA	1.1 J	NA	0.8 J
METHANE	µg/L	NA	1.2 J	19	NA	NA	NA	150	NA	NA	94	NA	970	NA	630

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-094 MW-40-34 8/9/2005	90-153 MW-40-34 8/22/2005	90-154 (FD) MW-40-34 8/22/2005	90-FP-108 MW-40-34 9/15/2005	90-185 MW-40-34 9/27/2005	90-006 MW-40-35 3/22/2005	90-FP-003 MW-40-35 4/4/2005	90-FP-012 MW-40-35 4/4/2005	90-FP-025 MW-40-35 4/12/2005	90-046 MW-40-35 4/26/2005	90-FP-050 MW-40-35 5/10/2005	90-066 MW-40-35 5/26/2005	90-FP-068 MW-40-35 6/9/2005	90-114 MW-40-35 7/1/2005	90-FP-081 MW-40-35 7/13/2005	90-135 MW-40-35 7/26/2005	90-FP-095 MW-40-35 8/9/2005	90-155 MW-40-35 8/22/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	NA	1300	NA	NA	1190	5150	NA	NA	NA	12700	NA	25000	NA	23300	NA	22400	NA	28600
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	NA	323	NA	NA	247	NA	NA	NA	NA	875	NA	1930	NA	205	NA	231	NA	283
NITRATE AS N	mg/L	NA	0.429	NA	NA	0.249	NA	NA	NA	NA	0.472	NA	0.1 U	NA	0.1 U	NA	0.1 U	NA	0.2 U
NITRITE AS N	mg/L	NA	0.1 U	NA	NA	0.1 U	NA	NA	NA	NA	0.1 U	NA	0.1 U	NA	NA	NA	1 U	NA	1 U
SULFATE	mg/L	NA	216	NA	NA	195	NA	NA	NA	NA	223	NA	51.4	NA	25.7	NA	24.3	NA	20
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	NA	353	NA	NA	391	193	NA	NA	NA	2720	NA	4290	NA	5800	NA	5590	NA	5640
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	NA	NA	NA	0.65	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																			
NITRITE AS N	mg/L	NA	NA	NA	NA	NA	0.044	NA	NA	NA	NA	NA	NA	NA	0.067 J	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	NA	NA	360	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	NA	33.2	NA	NA	20.8	55.5	NA	NA	NA	9360	NA	8590	NA	19900	NA	15400	NA	24900
Metals (EPA Method 6010B)																			
CALCIUM	mg/L	NA	135	NA	NA	113	496	NA	NA	NA	874	NA	637	NA	518	NA	428	NA	554
IRON	mg/L	NA	0.777	NA	NA	2.23	0.301	NA	NA	NA	21.7	NA	57.4	NA	84.1	NA	79.8	NA	120
MAGNESIUM	mg/L	NA	31.9	NA	NA	27.2	181	NA	NA	NA	193	NA	122	NA	94.4	NA	79.1	NA	113
POTASSIUM	mg/L	NA	3.7 J	NA	NA	4.9 J	16.6	NA	NA	NA	15.7	NA	15.8	NA	14.5	NA	14.7	NA	15.1
SODIUM	mg/L	NA	287	NA	NA	270	834	NA	NA	NA	2010	NA	4600	NA	5280	NA	4790	NA	4500
ANTIMONY	µg/L	NA	NA	NA	NA	NA	300 U	NA	NA	NA	300 U	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	NA	NA	NA	500 U	NA	NA	NA	32 J	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	NA	NA	NA	126	NA	NA	NA	334	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	NA	NA	NA	3 U	NA	NA	NA	3 U	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	NA	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	NA	NA	NA	70 U	NA	NA	NA	74.6	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	NA	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	NA	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	NA	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	NA	NA	NA	50 U	NA	NA	NA	35.2 J	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	NA	NA	NA	750 U	NA	NA	NA	750 U	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	NA	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	NA	NA	NA	400 U	NA	NA	NA	400 U	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	NA	NA	NA	80 U	NA	NA	NA	121	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	NA	NA	NA	22.5	NA	NA	NA	12 J	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	NA	NA	NA	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	NA	50 U	50 U	NA	50 U	50 UJ	NA	NA	NA	50 UJ	NA	50 UJ	NA	50 UJ	NA	50 U	NA	50 U
BENZENE	µg/L	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
BROMODICHLOROMETHANE	µg/L	NA	1 U	1 U	NA	1 U	0.33 J	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
BROMOFORM	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
BROMOMETHANE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
2-BUTANONE	µg/L	NA	50 U	50 U	NA	50 U	50 UJ	NA	NA	NA	74 J	NA	77	NA	49 J	NA	60	NA	84
CARBON TETRACHLORIDE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
CHLOROBENZENE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
CHLOROETHANE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
CHLOROFORM	µg/L	NA	1 U	1 U	NA	0.3 J	1	NA	NA	NA	2.3	NA	5	NA	7.2 J	NA	6.1	NA	4.3
CHLOROMETHANE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
DIBROMOCHLOROMETHANE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
1,1-DICHLOROETHANE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-094 MW-40-34 8/9/2005	90-153 MW-40-34 8/22/2005	90-154 (FD) MW-40-34 8/22/2005	90-FP-108 MW-40-34 9/15/2005	90-185 MW-40-34 9/27/2005	90-006 MW-40-35 3/22/2005	90-FP-003 MW-40-35 4/4/2005	90-FP-012 MW-40-35 4/4/2005	90-FP-025 MW-40-35 4/12/2005	90-046 MW-40-35 4/26/2005	90-FP-050 MW-40-35 5/10/2005	90-066 MW-40-35 5/26/2005	90-FP-068 MW-40-35 6/9/2005	90-114 MW-40-35 7/1/2005	90-FP-081 MW-40-35 7/13/2005	90-135 MW-40-35 7/26/2005	90-FP-095 MW-40-35 8/9/2005	90-155 MW-40-35 8/22/2005
Analyte	**Units**																		
1,2-DICHLOROETHANE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
1,1-DICHLOROETHENE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	0.2 J	NA	1 U
CIS-1,2-DICHLOROETHENE	µg/L	NA	20	18	NA	65	1.9	NA	NA	NA	7.6	NA	13	NA	27 J	NA	19	NA	20
TRANS-1,2-DICHLOROETHENE	µg/L	NA	1 U	1 U	NA	0.46 J	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
1,2-DICHLOROPROPANE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 UJ	NA	1 U	NA	1 U	NA	1 U
ETHYLBENZENE	µg/L	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
2-HEXANONE	µg/L	NA	50 U	50 U	NA	50 U	50 U	NA	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U	NA	50 U
METHYL TERT-BUTYL ETHER	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
4-METHYL-2-PENTANONE	µg/L	NA	50 U	50 U	NA	50 U	50 U	NA	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U	NA	50 U
METHYLENE CHLORIDE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	4.9	NA	9.3	NA	10 J	NA	7.1	NA	6.5
STYRENE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
TETRACHLOROETHENE	µg/L	NA	150	190	NA	190	110	NA	NA	NA	140	NA	73	NA	58	NA	56	NA	26
TOLUENE	µg/L	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	NA	NA	0.25 J	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
1,1,1-TRICHLOROETHANE	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	0.32 JB	NA	1 U
TRICHLOROETHENE	µg/L	NA	5	4.9	NA	12	2.1	NA	NA	NA	4.4	NA	3.6	NA	5.2 J	NA	4.4	NA	2.9
VINYL ACETATE	µg/L	NA	50 U	50 U	NA	50 U	50 U	NA	NA	NA	10 J	NA	50 U	NA	50 U	NA	50 U	NA	50 U
VINYL CHLORIDE	µg/L	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
XYLENES (TOTAL)	µg/L	NA	1 U	1 U	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	NA	4.19	NA	NA	3.38	1.23	NA	NA	NA	3710	NA	7600	NA	7890	NA	7150	NA	6660
CHLORIDE-CL	mg/L	NA	NA	NA	NA	NA	2350	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	22.48	22.51	NA	22.48	22.62	22.67	NA	22.95	22.21	22.9	23.07	22.89	23.26	23.06	23.56	24.01	23.65	24
ALKALINITY	mg/L	386	312	NA	315	348	172	NA	NA	540	960	2160	1420	2430	2730	4170	3170	3220	3560
CHEMICAL OXYGEN DEMAND	mg/L	0	4	NA	5	0	107	0	NA	1095	3564	6462	15282	9702	10404	10872	8604	7750	10008
DISSOLVED OXYGEN	mg/L	0.15	0.12	NA	0.1	0.11	1.18	NA	0.5	0.34	0.03	0.18	0.13	0.05	0.13	0.15	0.2	0.17	0.17
IRON	mg/L	1.2	0.4	NA	2.4	1.6	0	NA	NA	1.5	3.8	4	5.8	6.8	6.8	3.7	8	3	5.2
NITRATE	mg/L	4.6	3	NA	3.5	2.6	0.5	NA	NA	2.3	29.4	18.8	35	35	35	8.4	35	735	3
SULFATE	mg/L	110	200	NA	200	200	200	NA	NA	200	200	50	50	140	50	50	50	50	50
OXIDATION REDUCTION POTENTIAL	MV	100	62	NA	-156	-104	-545	NA	181	-453	-347	-295	-301	-142	-36	21	42	123	96
DISSOLVED HYDROGEN	nM	NA	2.3	NA	NA	NA	1.7	NA	NA	NA	6400	NA	9300	NA	8300	NA	6900	NA	3000
PH	PH_UNITS	6.8	6.84	NA	7.06	6.45	7.2	NA	6.8	6.35	5.82	5.81	6	6.33	6.15	6.14	6.31	6.14	6.12
CARBON DIOXIDE	ppm	32	20	NA	18	35	18	NA	NA	165	400	450	560	425	560	560	625	525	625
SPECIFIC CONDUCTIVITY	µmhos/cm	1490	1870	NA	1570	1520	7430	NA	5490	7040	9800	10740	13140	11720	12700	12410	12200	11290	12250
HYDROGEN SULFIDE	µg/L	NA	8.03	NA	NA	0.42 U	0.42 U	NA	NA	NA	53.7	NA	474	NA	3.24	NA	12.8	NA	200
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	NA	45000	NA	NA	230000	18000	NA	NA	NA	760000	NA	1300000	NA	1700000	NA	2100000	NA	980000
ETHANE	µg/L	NA	1.3 U	NA	NA	1.3 U	1.2 J	NA	NA	NA	1 J	NA	0.68 J	NA	1.3 U	NA	1.3 U	NA	1.3 U
ETHENE	µg/L	NA	1.2 U	NA	NA	0.69 J	1.6	NA	NA	NA	0.78 J	NA	1.2 U	NA	1.2 U	NA	1.2 U	NA	1.2 U
METHANE	µg/L	NA	3500	NA	NA	9700	410	NA	NA	NA	490	NA	150	NA	140	NA	2500	NA	5500

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-109 MW-40-35 9/15/2005	90-186 MW-40-35 9/27/2005	90-007 MW-40-36 3/22/2005	90-FP-004 MW-40-36 4/4/2005	90-FP-013 MW-40-36 4/4/2005	90-FP-026 MW-40-36 4/12/2005	90-047 MW-40-36 4/26/2005	90-FP-041 MW-40-36 5/4/2005	90-FP-051 MW-40-36 5/10/2005	90-067 MW-40-36 5/25/2005	90-FP-069 MW-40-36 6/9/2005	90-098 MW-40-36 6/29/2005	90-FP-082 MW-40-36 7/13/2005	90-137 MW-40-36 7/27/2005	90-138 (FD) MW-40-36 7/27/2005	90-FP-096 MW-40-36 8/9/2005	90-157 MW-40-36 8/23/2005	90-FP-110 MW-40-36 9/15/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	NA	19300	1080	NA	NA	NA	1100	NA	NA	1170	NA	1150	NA	1130	NA	NA	1200	NA
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	NA	253	NA	NA	NA	NA	273	NA	NA	307	NA	305	NA	390	NA	NA	349	NA
NITRATE AS N	mg/L	NA	0.1 U	NA	NA	NA	NA	2.2	NA	NA	2.14 J	NA	0.823	NA	1.06	NA	NA	1.2	NA
NITRITE AS N	mg/L	NA	0.1 U	NA	NA	NA	NA	0.1 U	NA	NA	0.1 UJ	NA	0.1 U	NA	0.1 U	NA	NA	0.5 U	NA
SULFATE	mg/L	NA	16	NA	NA	NA	NA	190	NA	NA	196	NA	178	NA	185	NA	NA	170	NA
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	NA	5910	191	NA	NA	NA	206	NA	NA	208	NA	219	NA	213	NA	NA	201	NA
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	0.81	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																			
NITRITE AS N	mg/L	NA	NA	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	209	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	NA	11000	10 U	NA	NA	NA	10 U	NA	NA	10 U	NA	11.6	NA	10 U	NA	NA	72	NA
Metals (EPA Method 6010B)																			
CALCIUM	mg/L	NA	788	75	NA	NA	NA	120	NA	NA	128	NA	125	NA	121	NA	NA	150	NA
IRON	mg/L	NA	119	0.181	NA	NA	NA	0.1 U	NA	NA	0.1 U	NA	0.0547 J	NA	0.0991 J	NA	NA	0.1 U	NA
MAGNESIUM	mg/L	NA	104	35.4	NA	NA	NA	34.6	NA	NA	34.6	NA	39	NA	35.6	NA	NA	37.5	NA
POTASSIUM	mg/L	NA	19	12.1	NA	NA	NA	6.2	NA	NA	4.26 J	NA	7.2	NA	5.91	NA	NA	6.57	NA
SODIUM	mg/L	NA	3360	250	NA	NA	NA	194	NA	NA	175	NA	225	NA	198	NA	NA	178	NA
ANTIMONY	µg/L	NA	NA	300 U	NA	NA	NA	300 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	500 U	NA	NA	NA	500 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	13.1 J	NA	NA	NA	16.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	3 U	NA	NA	NA	3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	21.6 J	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	750 U	NA	NA	NA	750 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	400 U	NA	NA	NA	400 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	80 U	NA	NA	NA	80 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	NA	50 U	50 UJ	NA	NA	NA	50 UJ	NA	NA	50 UJ	NA	50 UJ	NA	50 U	50 U	NA	50 U	NA
BENZENE	µg/L	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA
BROMODICHLOROMETHANE	µg/L	NA	1 U	0.37 J	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
BROMOFORM	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
BROMOMETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
2-BUTANONE	µg/L	NA	120 J	50 UJ	NA	NA	NA	50 UJ	NA	NA	50 UJ	NA	50 UJ	NA	50 U	50 U	NA	50 U	NA
CARBON TETRACHLORIDE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
CHLOROBENZENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
CHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
CHLOROFORM	µg/L	NA	2.8	1.7	NA	NA	NA	0.68 J	NA	NA	0.43 J	NA	0.67 J	NA	0.59 J	0.62 J	NA	0.31 J	NA
CHLOROMETHANE	µg/L	NA	0.31 J	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
DIBROMOCHLOROMETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
1,1-DICHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-FP-109 MW-40-35 9/15/2005	90-186 MW-40-35 9/27/2005	90-007 MW-40-36 3/22/2005	90-FP-004 MW-40-36 4/4/2005	90-FP-013 MW-40-36 4/4/2005	90-FP-026 MW-40-36 4/12/2005	90-047 MW-40-36 4/26/2005	90-FP-041 MW-40-36 5/4/2005	90-FP-051 MW-40-36 5/10/2005	90-067 MW-40-36 5/25/2005	90-FP-069 MW-40-36 6/9/2005	90-098 MW-40-36 6/29/2005	90-FP-082 MW-40-36 7/13/2005	90-137 MW-40-36 7/27/2005	90-138 (FD) MW-40-36 7/27/2005	90-FP-096 MW-40-36 8/9/2005	90-157 MW-40-36 8/23/2005	90-FP-110 MW-40-36 9/15/2005
Analyte	**Units**																		
1,2-DICHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
1,1-DICHLOROETHENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
CIS-1,2-DICHLOROETHENE	µg/L	NA	23	11	NA	NA	NA	22	NA	NA	18	NA	49	NA	28	29	NA	14	NA
TRANS-1,2-DICHLOROETHENE	µg/L	NA	1 U	1 U	NA	NA	NA	0.46 J	NA	NA	0.31 J	NA	0.43 J	NA	0.38 J	0.38 J	NA	0.22 J	NA
1,2-DICHLOROPROPANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
CIS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
TRANS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
ETHYLBENZENE	µg/L	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA
2-HEXANONE	µg/L	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	50 U	NA	50 U	NA
METHYL TERT-BUTYL ETHER	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
4-METHYL-2-PENTANONE	µg/L	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	50 U	NA	50 U	NA
METHYLENE CHLORIDE	µg/L	NA	9	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
STYRENE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
1,1,2,2-TETRACHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
TETRACHLOROETHENE	µg/L	NA	35	110	NA	NA	NA	300	NA	NA	310	NA	300	NA	310	310	NA	200	NA
TOLUENE	µg/L	NA	0.38 J	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA
1,1,2-TRICHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
1,1,1-TRICHLOROETHANE	µg/L	NA	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
TRICHLOROETHENE	µg/L	NA	5.2	13	NA	NA	NA	28	NA	NA	25	NA	34	NA	28	28	NA	16	NA
VINYL ACETATE	µg/L	NA	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	50 U	NA	50 U	NA
VINYL CHLORIDE	µg/L	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA
XYLENES (TOTAL)	µg/L	NA	0.31 J	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	NA	6020	1.92	NA	NA	NA	1.67	NA	NA	1.84	NA	1.61	NA	2.95	NA	NA	1.25	NA
CHLORIDE-CL	mg/L	NA	NA	340	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	23.95	24.21	22.65	NA	22.77	22.51	22.75	22.61	23.47	22.68	22.82	22.8	23.28	23.21	NA	23.32	23.19	23.61
ALKALINITY	mg/L	3550	3910	171	NA	NA	240	175	NA	208	204	212	160	194	180	NA	212	142	164
CHEMICAL OXYGEN DEMAND	mg/L	8082	8766	9	0	NA	0	0	12	0	0	0	6	27	18	NA	17	0	1
DISSOLVED OXYGEN	mg/L	0.08	0.08	0.87	NA	0.44	0.4	0.38	0.44	0.3	0.31	0.14	0.19	0.18	0.26	NA	0.15	0.25	0.17
IRON	mg/L	7.4	5	0	NA	NA	0	0	NA	0	0	0	0	0	0	NA	5	0.14	6.2
NITRATE	mg/L	35	35	0.8	NA	NA	0.2	1.1	NA	0.7	0.5	0.6	1.4	0.3	0.7	NA	0.9	1.2	0
SULFATE	mg/L	50	50	200	NA	NA	200	200	NA	195	200	180	200	190	200	NA	200	200	200
OXIDATION REDUCTION POTENTIAL	MV	-134	-135	-674	NA	160	34	-329	154	29	256	35	89	99	113	NA	174	116	-15
DISSOLVED HYDROGEN	nM	NA	NA	2.9	NA	NA	NA	9.3	NA	NA	89	NA	7.6	NA	23	NA	NA	20	NA
PH	PH_UNITS	6.17	6.1	7.52	NA	7.23	7.08	6.92	7.49	6.87	6.95	7.37	7.48	6.98	7.41	NA	6.87	7.15	7.21
CARBON DIOXIDE	ppm	500	600	12	NA	NA	26	10	NA	17	14	11	14	16	17	NA	18	15	16
SPECIFIC CONDUCTIVITY	µmhos/cm	13760	13090	1810	NA	1690	1730	1770	1640	1580	1700	1510	1760	1490	1510	NA	1540	1620	1840
HYDROGEN SULFIDE	µg/L	NA	2	0.42 U	NA	NA	NA	0.42 U	NA	NA	0.42 U	NA	0.42 U	NA	0.42 U	NA	NA	0.42 U	NA
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	NA	1900000	9100	NA	NA	NA	31000	NA	NA	33000	NA	22000	NA	24000	NA	NA	20000	NA
ETHANE	µg/L	NA	1.3 U	0.94 J	NA	NA	NA	1.3 U	NA	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA	NA	1.3 U	NA
ETHENE	µg/L	NA	1.2 U	2.2	NA	NA	NA	1.2 U	NA	NA	1.2 U	NA	1.2 U	NA	1.2 U	NA	NA	1.2 U	NA
METHANE	µg/L	NA	6800	4	NA	NA	NA	1.5	NA	NA	1.1 J	NA	15	NA	7.8	NA	NA	87	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-187 MW-40-36 9/27/2005	90-008 MW-40-37 3/22/2005	90-FP-005 MW-40-37 4/4/2005	90-FP-017 MW-40-37 4/4/2005	90-FP-028 MW-40-37 4/12/2005	90-048 MW-40-37 4/26/2005	90-FP-042 MW-40-37 5/4/2005	90-FP-052 MW-40-37 5/10/2005	90-068 MW-40-37 5/25/2005	90-068 MW-40-37 5/25/2005	90-FP-075 MW-40-37 6/9/2005	90-099 MW-40-37 6/29/2005	90-FP-085 MW-40-37 7/14/2005	90-139 MW-40-37 7/27/2005	90-FP-097 MW-40-37 8/9/2005
Analyte	**Units**															
Residue, Filterable (EPA Method 160.1)																
TDS	mg/L	1140	1440	NA	NA	NA	1340	NA	NA	1560	NA	NA	1520	NA	1530	NA
Ion Chromatography (EPA Method 300.0)																
CHLORIDE	mg/L	353	NA	NA	NA	NA	372	NA	NA	464	NA	NA	401	NA	427	NA
NITRATE AS N	mg/L	0.968	NA	NA	NA	NA	0.1 U	NA	NA	0.1 UJ	NA	NA	0.1 U	NA	0.1 U	NA
NITRITE AS N	mg/L	0.1 U	NA	NA	NA	NA	0.1 U	NA	NA	0.1 UJ	NA	NA	0.1 U	NA	0.1 U	NA
SULFATE	mg/L	165	NA	NA	NA	NA	263	NA	NA	284	NA	NA	267	NA	282	NA
Total Alkalinity (EPA Method 310.1)																
ALKALINITY	mg/L	188	249	NA	NA	NA	256	NA	NA	238	NA	NA	262	NA	257	NA
Nitrogen as Nitrate (EPA Method 353.3)																
NITRATE-N	mg/L	NA	1.76	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)																
NITRITE AS N	mg/L	NA	0.453	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	275	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	10 U	11.7	NA	NA	NA	11.7	NA	NA	23.7	NA	NA	11.6	NA	10 U	NA
Metals (EPA Method 6010B)																
CALCIUM	mg/L	147	131	NA	NA	NA	137	NA	NA	143	NA	NA	157	NA	167	NA
IRON	mg/L	0.0655 J	0.1	NA	NA	NA	0.0896 J	NA	NA	0.162	NA	NA	0.269	NA	0.27	NA
MAGNESIUM	mg/L	35.6	54.4	NA	NA	NA	50.5	NA	NA	51.6	NA	NA	54.8	NA	51.7	NA
POTASSIUM	mg/L	4.73 J	15.5	NA	NA	NA	13.5	NA	NA	12.6	NA	NA	12.7	NA	10	NA
SODIUM	mg/L	167	288	NA	NA	NA	274	NA	NA	264	NA	NA	279	NA	261	NA
ANTIMONY	µg/L	NA	300 U	NA	NA	NA	300 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	500 U	NA	NA	NA	11.3 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	17.1 J	NA	NA	NA	17.1 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	3 U	NA	NA	NA	3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	40 U	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	750 U	NA	NA	NA	750 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	70 U	NA	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	400 U	NA	NA	NA	400 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	80 U	NA	NA	NA	80 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																
MERCURY	µg/L	NA	1 U	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																
ACETONE	µg/L	50 U	50 UJ	NA	NA	NA	50 UJ	NA	NA	50 UJ	NA	NA	50 UJ	NA	50 U	NA
BENZENE	µg/L	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA
BROMODICHLOROMETHANE	µg/L	1 U	1.1	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
BROMOFORM	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
BROMOMETHANE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
2-BUTANONE	µg/L	50 U	50 UJ	NA	NA	NA	50 UJ	NA	NA	50 UJ	NA	NA	50 UJ	NA	50 U	NA
CARBON TETRACHLORIDE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
CHLOROBENZENE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
CHLOROETHANE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
CHLOROFORM	µg/L	0.3 J	2.6	NA	NA	NA	2.1	NA	NA	1.1	NA	NA	2.7	NA	0.72 J	NA
CHLOROMETHANE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
DIBROMOCHLOROMETHANE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
1,1-DICHLOROETHANE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-187 MW-40-36 9/27/2005	90-008 MW-40-37 3/22/2005	90-FP-005 MW-40-37 4/4/2005	90-FP-017 MW-40-37 4/4/2005	90-FP-028 MW-40-37 4/12/2005	90-048 MW-40-37 4/26/2005	90-FP-042 MW-40-37 5/4/2005	90-FP-052 MW-40-37 5/10/2005	90-068 MW-40-37 5/25/2005	90-068 MW-40-37 5/25/2005	90-FP-075 MW-40-37 6/9/2005	90-099 MW-40-37 6/29/2005	90-FP-085 MW-40-37 7/14/2005	90-139 MW-40-37 7/27/2005	90-FP-097 MW-40-37 8/9/2005
Analyte	**Units**															
1,2-DICHLOROETHANE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
1,1-DICHLOROETHENE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	0.21 J	NA	NA	0.49 J	NA	0.34 J	NA
CIS-1,2-DICHLOROETHENE	µg/L	13	5	NA	NA	NA	4.9	NA	NA	110	NA	NA	280	NA	170	NA
TRANS-1,2-DICHLOROETHENE	µg/L	0.23 J	1 U	NA	NA	NA	1 U	NA	NA	0.44 J	NA	NA	1.3	NA	0.92 J	NA
1,2-DICHLOROPROPANE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
CIS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	10 U	NA	1 U	NA	1 U	NA
TRANS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	10 U	NA	1 U	NA	1 U	NA
ETHYLBENZENE	µg/L	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	5 U	NA	0.5 U	NA	0.5 U	NA
2-HEXANONE	µg/L	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA
METHYL TERT-BUTYL ETHER	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
4-METHYL-2-PENTANONE	µg/L	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA
METHYLENE CHLORIDE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
STYRENE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	10 U	NA	1 U	NA	1 U	NA
1,1,2,2-TETRACHLOROETHANE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
TETRACHLOROETHENE	µg/L	190	250	NA	NA	NA	330	NA	NA	190	NA	NA	15	NA	140	NA
TOLUENE	µg/L	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	NA	0.65	NA	0.5 U	NA
1,1,2-TRICHLOROETHANE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
1,1,1-TRICHLOROETHANE	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
TRICHLOROETHENE	µg/L	14	12	NA	NA	NA	12	NA	NA	63	NA	NA	16	NA	72	NA
VINYL ACETATE	µg/L	50 U	50 U	NA	NA	NA	50 U	NA	NA	50 U	NA	NA	50 U	NA	50 U	NA
VINYL CHLORIDE	µg/L	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA
XYLENES (TOTAL)	µg/L	1 U	1 U	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	1 U	NA
TOC (EPA Method 9060)																
TOTAL ORGANIC CARBON	mg/L	2.17	1.67	NA	NA	NA	6.05	NA	NA	2.19	NA	NA	2.18	NA	2.67	NA
CHLORIDE-CL	mg/L	NA	440	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																
TEMPERATURE	C	23.73	22.49	NA	22.75	22.45	23.12	22.69	22.96	22.74	NA	27.2	22.74	22.96	23.19	23.44
ALKALINITY	mg/L	160	201	NA	NA	190	206	NA	226	230	NA	257	310	240	238	228
CHEMICAL OXYGEN DEMAND	mg/L	2	2	0	NA	18	0	17	0	0	NA	0	11	0	0	22
DISSOLVED OXYGEN	mg/L	0.17	1.07	NA	0.64	0.29	0.09	0.21	0.21	0.28	NA	0.2	0.18	0.27	0.28	0.18
IRON	mg/L	0	0	NA	NA	0	0.6	NA	0	0	NA	0	0	0	0	0
NITRATE	mg/L	8.3	1.5	NA	NA	0.7	3.7	NA	1	6.2	NA	2	1.1	1.3	1.5	1.4
SULFATE	mg/L	200	175	NA	NA	200	200	NA	200	200	NA	185	200	200	200	200
OXIDATION REDUCTION POTENTIAL	MV	10	-506	NA	175	-409	-294	-15	15	161	NA	1	67	151	108	169
DISSOLVED HYDROGEN	nM	NA	0.97	NA	NA	NA	3.2	NA	NA	4.3	NA	NA	2	NA	4.2	NA
PH	PH_UNITS	6.89	7.53	NA	7.55	7.29	7.27	8.03	7.31	7.39	NA	7.65	7.55	7.37	7.55	7.14
CARBON DIOXIDE	ppm	10.5	13	NA	NA	30	10	NA	11.5	11	NA	12	14	12	14	15
SPECIFIC CONDUCTIVITY	µmhos/cm	1840	2290	NA	2220	2190	2320	2250	2100	2260	NA	1890	2230	1960	2010	2000
HYDROGEN SULFIDE	µg/L	0.42 U	0.42 U	NA	NA	NA	15.6	NA	NA	0.42 U	NA	NA	0.42 U	NA	0.42 U	NA
Dissolved Gases (Method RSK-175)																
CARBON DIOXIDE	µg/L	29000	11000	NA	NA	NA	13000	NA	NA	15000	NA	NA	16000	NA	17000	NA
ETHANE	µg/L	1.3 U	1.3 U	NA	NA	NA	1.3 U	NA	NA	1.3 U	NA	NA	1.3 U	NA	1.3 U	NA
ETHENE	µg/L	1.2 U	1.5	NA	NA	NA	3.7	NA	NA	4.6	NA	NA	5.7	NA	5	NA
METHANE	µg/L	310	2.4	NA	NA	NA	2.3	NA	NA	12	NA	NA	41	NA	120	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-161 MW-40-37 8/23/2005	90-FP-111 MW-40-37 9/15/2005	90-188 MW-40-37 9/27/2005	90-023 MW-40-38 3/25/2005	90-FP-019 MW-40-38 4/4/2005	90-FP-032 MW-40-38 4/12/2005	90-053 MW-40-38 4/27/2005	90-054 (FD) MW-40-38 4/27/2005	90-FP-044 MW-40-38 5/4/2005	90-FP-058 MW-40-38 5/12/2005	90-073 MW-40-38 5/26/2005	90-074 (FD) MW-40-38 5/26/2005	90-FP-073 MW-40-38 6/9/2005	90-109 MW-40-38 6/30/2005	90-110 (FD) MW-40-38 6/30/2005	90-FP-089 MW-40-38 7/14/2005	90-146 MW-40-38 7/29/2005	90-FP-101 MW-40-38 8/10/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	1540	NA	1490	840	NA	NA	815	NA	NA	NA	920	NA	NA	880	NA	NA	1010	NA
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	416	NA	422	NA	NA	NA	218	NA	NA	NA	237	NA	NA	247	NA	NA	261	NA
NITRATE AS N	mg/L	0.5 U	NA	0.1 U	NA	NA	NA	4.11	NA	NA	NA	3.97	NA	NA	3.78 J	NA	NA	2.84	NA
NITRITE AS N	mg/L	0.5 U	NA	0.1 U	NA	NA	NA	0.1 U	NA	NA	NA	0.1 U	NA	NA	0.1 U	NA	NA	0.1 U	NA
SULFATE	mg/L	276	NA	289	NA	NA	NA	116	NA	NA	NA	103	NA	NA	106	NA	NA	98.7	NA
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	266	NA	246	173	NA	NA	206	NA	NA	NA	197	NA	NA	194	NA	NA	192	NA
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	NA	3.36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)	mg/L																		
NITRITE AS N	mg/L	NA	NA	NA	0.095	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	115	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	27.7	NA	10 U	10 U	NA	NA	10 U	NA	NA	NA	10 U	NA	NA	10 U	NA	NA	10 U	NA
Metals (EPA Method 6010B)																			
CALCIUM	mg/L	169	NA	180	83.3	NA	NA	81.9	NA	NA	NA	87.5	NA	NA	91.6	NA	NA	104	NA
IRON	mg/L	0.289	NA	0.304	0.12	NA	NA	0.1 U	NA	NA	NA	0.1 U	NA	NA	0.0542 J	NA	NA	0.1 U	NA
MAGNESIUM	mg/L	51.5	NA	52.3	26.5	NA	NA	26.8	NA	NA	NA	28.6	NA	NA	28.3	NA	NA	29.6	NA
POTASSIUM	mg/L	13.6	NA	10.6	8.29	NA	NA	7.35	NA	NA	NA	7.86	NA	NA	6.72	NA	NA	6.59	NA
SODIUM	mg/L	249	NA	238	171 J	NA	NA	157	NA	NA	NA	153	NA	NA	153	NA	NA	155	NA
ANTIMONY	µg/L	NA	NA	NA	300 U	NA	NA	300 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	NA	500 U	NA	NA	500 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	NA	25.8	NA	NA	23.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	NA	3 U	NA	NA	3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	NA	40 U	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	NA	60 U	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	NA	40 U	NA	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	NA	50 U	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	NA	50 U	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	NA	750 U	NA	NA	750 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	NA	70 U	NA	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	NA	400 U	NA	NA	400 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	NA	80 U	NA	NA	80 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	NA	10.2 J	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	50 U	NA	50 U	50 UJ	NA	NA	50 UJ	50 UJ	NA	NA	50 UJ	50 UJ	NA	50 UJ	50 UJ	NA	50 U	NA
BENZENE	µg/L	0.5 U	NA	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA
BROMODICHLOROMETHANE	µg/L	1 U	NA	1 U	1.6	NA	NA	1	1.1	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
BROMOFORM	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
BROMOMETHANE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
2-BUTANONE	µg/L	50 U	NA	50 U	50 UJ	NA	NA	50 U	50 U	NA	NA	50 U	50 U	NA	50 UJ	50 UJ	NA	50 U	NA
CARBON TETRACHLORIDE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
CHLOROBENZENE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
CHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
CHLOROFORM	µg/L	0.34 J	NA	0.41 J	2.6	NA	NA	1.8	1.9	NA	NA	1.2	1.3	NA	1.3	1.3	NA	0.95 J	NA
CHLOROMETHANE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
DIBROMOCHLOROMETHANE	µg/L	1 U	NA	1 U	1.2	NA	NA	0.76 J	0.78 J	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
1,1-DICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-161 MW-40-37 8/23/2005	90-FP-111 MW-40-37 9/15/2005	90-188 MW-40-37 9/27/2005	90-023 MW-40-38 3/25/2005	90-FP-019 MW-40-38 4/4/2005	90-FP-032 MW-40-38 4/12/2005	90-053 MW-40-38 4/27/2005	90-054 (FD) MW-40-38 4/27/2005	90-FP-044 MW-40-38 5/4/2005	90-FP-058 MW-40-38 5/12/2005	90-073 MW-40-38 5/26/2005	90-074 (FD) MW-40-38 5/26/2005	90-FP-073 MW-40-38 6/9/2005	90-109 MW-40-38 6/30/2005	90-110 (FD) MW-40-38 6/30/2005	90-FP-089 MW-40-38 7/14/2005	90-146 MW-40-38 7/29/2005	90-FP-101 MW-40-38 8/10/2005
Analyte	Units																		
1,2-DICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
1,1-DICHLOROETHENE	µg/L	1 U	NA	0.2 J	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
CIS-1,2-DICHLOROETHENE	µg/L	100	NA	79	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
TRANS-1,2-DICHLOROETHENE	µg/L	0.92 J	NA	0.54 J	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
1,2-DICHLOROPROPANE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
CIS-1,3-DICHLOROPROPENE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
TRANS-1,3-DICHLOROPROPENE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 UJ	1 UJ	NA	1 U	1 U	NA	1 U	NA
ETHYLBENZENE	µg/L	0.5 U	NA	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA
2-HEXANONE	µg/L	50 U	NA	50 U	50 U	NA	NA	50 U	50 U	NA	NA	50 U	50 U	NA	50 U	50 U	NA	50 U	NA
METHYL TERT-BUTYL ETHER	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
4-METHYL-2-PENTANONE	µg/L	50 U	NA	50 U	50 U	NA	NA	50 U	50 U	NA	NA	50 U	50 U	NA	50 U	50 U	NA	50 U	NA
METHYLENE CHLORIDE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
STYRENE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
1,1,2,2-TETRACHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
TETRACHLOROETHENE	µg/L	170	NA	370	0.56 J	NA	NA	0.62 J	0.66 J	NA	NA	0.61 J	0.62 J	NA	0.97 J	0.93 J	NA	0.6 J	NA
TOLUENE	µg/L	0.5 U	NA	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.22 J	NA
1,1,2-TRICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
1,1,1-TRICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
TRICHLOROETHENE	µg/L	56	NA	53	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
VINYL ACETATE	µg/L	50 U	NA	50 U	50 U	NA	NA	50 UJ	50 UJ	NA	NA	50 U	50 U	NA	50 U	50 U	NA	50 U	NA
VINYL CHLORIDE	µg/L	0.5 U	NA	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA
XYLENES (TOTAL)	µg/L	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	1 U	1 U	NA	1 U	NA
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	1.88	NA	3.21	2.13	NA	NA	2.32	NA	NA	NA	2.19	NA	NA	2.25	NA	NA	2.52	NA
CHLORIDE-CL	mg/L	NA	NA	NA	430	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	23.37	23.55	23.64	21.05	21.91	21.51	22.01	NA	21.58	22.15	21.63	NA	22.19	22.09	NA	22.1	22.4	22.41
ALKALINITY	mg/L	180	206	240	150	NA	155	153	NA	NA	197	203	NA	199	NA	NA	189	172	250
CHEMICAL OXYGEN DEMAND	mg/L	0	0	44	0	NA	0	0	NA	0	0	0	NA	0	NA	NA	0	7	0
DISSOLVED OXYGEN	mg/L	0.15	0.16	0.16	2.19	1.22	0.79	0.38	NA	0.37	0.28	0.3	NA	0.16	0.15	NA	0.19	0.21	0.15
IRON	mg/L	0	0	0	0	NA	0	0	NA	NA	0	0	NA	0	NA	NA	0	0	0
NITRATE	mg/L	0.5	0.9	1.7	0.6	NA	4.5	0.3	NA	NA	1.3	0.4	NA	0.7	NA	NA	0.1	3.2	0.9
SULFATE	mg/L	200	200	200	175	NA	150	200	NA	NA	200	175	NA	200	NA	NA	180	150	150
OXIDATION REDUCTION POTENTIAL	MV	120	-57	-59	-588	188	120	-178	NA	89	-171	221	NA	7	152	NA	121	151	218
DISSOLVED HYDROGEN	nM	4.7	NA	NA	1	NA	NA	1.7	NA	NA	NA	18	NA	NA	1.4	NA	NA	1.9	NA
PH	PH_UNITS	7.53	7.57	7.28	7.71	7.54	7.53	7.39	NA	7.87	7.42	7.42	NA	7.74	7.36	NA	7.41	7.63	7.43
CARBON DIOXIDE	ppm	10	10.5	10	14	NA	19	10	NA	NA	11	10.5	NA	10	NA	NA	10	15	10
SPECIFIC CONDUCTIVITY	µmhos/cm	2060	2370	2340	1360	1278	1322	1394	NA	1290	1254	1330	NA	1184	1195	NA	1235	1280	1319
HYDROGEN SULFIDE	µg/L	0.42 U	NA	0.42 U	0.42 U	NA	NA	0.42 U	NA	NA	NA	0.42 U	NA	NA	0.42 U	NA	NA	0.42 U	NA
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	16000	NA	16000	7400	NA	NA	10000	NA	NA	NA	11000	NA	NA	11000	NA	NA	9700	NA
ETHANE	µg/L	1.3 U	NA	1.3 U	1.3 U	NA	NA	1.3 U	NA	NA	NA	1.3 U	NA	NA	1.3 U	NA	NA	1.3 U	NA
ETHENE	µg/L	4.1	NA	3.5	0.99 J	NA	NA	1.1 J	NA	NA	NA	1.6	NA	NA	1.2 U	NA	NA	1.2 U	NA
METHANE	µg/L	110	NA	190	2.3	NA	NA	1.5	NA	NA	NA	1.5	NA	NA	1.4	NA	NA	1.6	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-165 MW-40-38 8/24/2005	90-FP-116 MW-40-38 9/16/2005	90-202 MW-40-38 9/29/2005	90-015 MW-40-39 3/23/2005	90-FP-018 MW-40-39 4/4/2005	90-049 MW-40-39 4/28/2005	90-FP-045 MW-40-39 5/4/2005	90-FP-053 MW-40-39 5/10/2005	90-069 MW-40-39 5/26/2005	90-FP-076 MW-40-39 6/9/2005	90-107 MW-40-39 6/30/2005	90-FP-084 MW-40-39 7/13/2005	90-148 MW-40-39 7/29/2005	90-FP-104 MW-40-39 8/10/2005	90-160 MW-40-39 8/23/2005	90-FP-118 MW-40-39 9/16/2005	90-198 MW-40-39 9/29/2005	90-199 (FD) MW-40-39 9/29/2005
Analyte	**Units**																		
Residue, Filterable (EPA Method 160.1)																			
TDS	mg/L	925	NA	935	2120	NA	2410	NA	NA	2150	NA	2180	NA	2450	NA	2100	NA	2300	NA
Ion Chromatography (EPA Method 300.0)																			
CHLORIDE	mg/L	268	NA	241	NA	NA	708	NA	NA	686	NA	651	NA	682	NA	716	NA	665	NA
NITRATE AS N	mg/L	3.05	NA	4.01	NA	NA	6.11	NA	NA	6.12	NA	5.88 J	NA	4.9	NA	4.52	NA	4.34	NA
NITRITE AS N	mg/L	0.5 U	NA	0.1 U	NA	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U	NA	0.1 U	NA	0.5 U	NA	0.1 U	NA
SULFATE	mg/L	105	NA	128	NA	NA	363	NA	NA	397	NA	374	NA	356	NA	337	NA	318	NA
Total Alkalinity (EPA Method 310.1)																			
ALKALINITY	mg/L	201	NA	201	261	NA	268	NA	NA	259	NA	292	NA	231	NA	238	NA	221	NA
Nitrogen as Nitrate (EPA Method 353.3)																			
NITRATE-N	mg/L	NA	NA	NA	4.94 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)	mg/L																		
NITRITE AS N	mg/L	NA	NA	NA	0.182	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	88.4	NA	13	10 U	NA	26.7	NA	NA	29.6	NA	11.6	NA	10 U	NA	11.1	NA	18.3	NA
Metals (EPA Method 6010B)																			
CALCIUM	mg/L	107	NA	102	203	NA	218	NA	NA	230	NA	238	NA	235	NA	252	NA	250	NA
IRON	mg/L	0.1 U	NA	0.1 U	0.149	NA	0.1 U	NA	NA	0.121	NA	0.1 U	NA	0.1 U	NA	0.1 U	NA	0.0861 J	NA
MAGNESIUM	mg/L	30.6	NA	31.2	71.5	NA	63.4	NA	NA	65.8	NA	65	NA	62.9	NA	66	NA	64.5	NA
POTASSIUM	mg/L	7.14	NA	4.58 J	19.7	NA	12.5	NA	NA	12.1	NA	10.2	NA	9.59	NA	11.1	NA	9.55	NA
SODIUM	mg/L	160	NA	173	450	NA	400	NA	NA	392	NA	377	NA	362	NA	360	NA	373	NA
ANTIMONY	µg/L	NA	NA	NA	300 U	NA	300 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	NA	500 U	NA	500 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	NA	20.9	NA	18.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	NA	3 U	NA	3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	NA	40 U	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	NA	70 U	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	NA	70 U	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	NA	60 U	NA	60 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	NA	40 U	NA	40 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	NA	50 U	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	NA	50 U	NA	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	NA	750 U	NA	750 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	NA	70 U	NA	70 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	NA	400 U	NA	400 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	NA	80 U	NA	80 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	NA	20 U	NA	20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)																			
MERCURY	µg/L	NA	NA	NA	1 U	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)																			
ACETONE	µg/L	50 U	NA	50 U	50 UJ	NA	50 UJ	NA	NA	50 UJ	NA	50 UJ	NA	50 U	NA	50 U	NA	50 U	50 U
BENZENE	µg/L	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U
BROMODICHLOROMETHANE	µg/L	1 U	NA	1 U	0.43 J	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
BROMOFORM	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
BROMOMETHANE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
2-BUTANONE	µg/L	50 U	NA	50 U	50 UJ	NA	50 UJ	NA	NA	50 U	NA	50 UJ	NA	50 U	NA	50 U	NA	50 U	50 U
CARBON TETRACHLORIDE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
CHLOROBENZENE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
CHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
CHLOROFORM	µg/L	0.66 J	NA	0.44 J	1	NA	0.22 J	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
CHLOROMETHANE	µg/L	1 U	NA	1 U	1 U	NA	1 UJ	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
DIBROMOCHLOROMETHANE	µg/L	1 U	NA	1 U	0.24 J	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
1,1-DICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-165 MW-40-38 8/24/2005	90-FP-116 MW-40-38 9/16/2005	90-202 MW-40-38 9/29/2005	90-015 MW-40-39 3/23/2005	90-FP-018 MW-40-39 4/4/2005	90-049 MW-40-39 4/28/2005	90-FP-045 MW-40-39 5/4/2005	90-FP-053 MW-40-39 5/10/2005	90-069 MW-40-39 5/26/2005	90-FP-076 MW-40-39 6/9/2005	90-107 MW-40-39 6/30/2005	90-FP-084 MW-40-39 7/13/2005	90-148 MW-40-39 7/29/2005	90-FP-104 MW-40-39 8/10/2005	90-160 MW-40-39 8/23/2005	90-FP-118 MW-40-39 9/16/2005	90-198 MW-40-39 9/29/2005	90-199 (FD) MW-40-39 9/29/2005
Analyte	**Units**																		
1,2-DICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
1,1-DICHLOROETHENE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
CIS-1,2-DICHLOROETHENE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
TRANS-1,2-DICHLOROETHENE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
1,2-DICHLOROPROPANE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 UJ	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
ETHYLBENZENE	µg/L	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U
2-HEXANONE	µg/L	50 U	NA	50 U	50 U	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U	NA	50 U	50 U
METHYL TERT-BUTYL ETHER	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
4-METHYL-2-PENTANONE	µg/L	50 U	NA	50 U	50 U	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U	NA	50 U	50 U
METHYLENE CHLORIDE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
STYRENE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
TETRACHLOROETHENE	µg/L	0.75 J	NA	0.73 J	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	0.34 J	NA	0.29 J	NA	0.34 J	0.35 J
TOLUENE	µg/L	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
1,1,1-TRICHLOROETHANE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
TRICHLOROETHENE	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
VINYL ACETATE	µg/L	50 U	NA	50 U	50 U	NA	50 U	NA	NA	50 U	NA	50 U	NA	50 U	NA	50 U	NA	50 U	50 U
VINYL CHLORIDE	µg/L	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U
XYLENES (TOTAL)	µg/L	1 U	NA	1 U	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	1 U
TOC (EPA Method 9060)																			
TOTAL ORGANIC CARBON	mg/L	2.33	NA	3.56	1.61	NA	1.49	NA	NA	1.37	NA	1.19	NA	1.57	NA	1.18	NA	2.04	NA
CHLORIDE-CL	mg/L	NA	NA	NA	750	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements																			
TEMPERATURE	C	22.48	22.71	22.95	22.74	23.3	22.55	23.09	23.17	22.94	23.56	23.17	23.56	23.69	23.72	23.66	23.77	23.62	NA
ALKALINITY	mg/L	NA	198	180	249	NA	220	NA	254	237	241	NA	225	228	205	180	223	210	NA
CHEMICAL OXYGEN DEMAND	mg/L	NA	9	0	0	NA	0	0	0	14	0	NA	0	16	0	0	1	0	NA
DISSOLVED OXYGEN	mg/L	0.2	0.25	0.23	0.34	0.51	0.19	0.25	0.24	0.3	0.19	0.25	0.38	0.23	0.16	0.19	0.21	0.21	NA
IRON	mg/L	NA	0.2	0	0.6	NA	0	NA	0	0.2	0	NA	0	0	0	0	0	0	NA
NITRATE	mg/L	NA	7.2	8.4	0.3	NA	3.1	NA	4.9	1.3	1.5	NA	0.6	0.7	0.6	1.9	6.7	6.5	NA
SULFATE	mg/L	NA	200	200	200	NA	200	NA	200	200	200	NA	200	200	200	200	200	200	NA
OXIDATION REDUCTION POTENTIAL	MV	217	-32	72	NA	204	-225	155	141	233	64	148	134	152	214	126	13	55	NA
DISSOLVED HYDROGEN	nM	3.6	NA	NA	0.97	NA	NA	NA	NA	NA	NA	1.2	NA	NA	NA	NA	NA	NA	NA
PH	PH_UNITS	7.48	7.49	7.31	7.9	7.3	7.2	7.76	7.04	7.14	7.39	7.14	6.86	7.3	7.22	7.33	7.24	7.08	NA
CARBON DIOXIDE	ppm	NA	15.5	10.5	20	NA	13	NA	14	14	11	NA	12.5	19	10	10	16	16	NA
SPECIFIC CONDUCTIVITY	µmhos/cm	1346	1530	1494	3430	3290	3540	3200	3050	3210	2820	2810	2820	2840	2910	2930	3300	3230	NA
HYDROGEN SULFIDE	µg/L	0.42 U	NA	0.42 U	0.42 U	NA	NA	NA	NA	NA	NA	0.42 U	NA	NA	NA	NA	NA	0.42 U	NA
Dissolved Gases (Method RSK-175)																			
CARBON DIOXIDE	µg/L	10000	NA	11000	15000	NA	20000	NA	NA	27000	NA	25000	NA	33000	NA	23000	NA	21000	NA
ETHANE	µg/L	1.3 U	NA	1.3 U	1.3 U	NA	1.3 U	NA	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA
ETHENE	µg/L	1.2 U	NA	1.2 U	0.69 J	NA	1.2 U	NA	NA	1.2 U	NA	1.2 U	NA	1.2 U	NA	1.2 U	NA	1.2 U	NA
METHANE	µg/L	1.3	NA	5.1	1.8	NA	1.1 J	NA	NA	0.78 J	NA	1.2 U	NA	1.2 U	NA	1.2 U	NA	1.2 U	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		90-FP-112	90-028	90-029	90-030	90-031	90-032	90-055	90-056	90-057	90-059	90-061	90-076	90-077	90-078
Sample Location		**MW-40-7**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**
Sample Date		**9/15/2005**	**3/21/2005**	**3/22/2005**	**3/23/2005**	**3/24/2005**	**3/25/2005**	**4/25/2005**	**4/26/2005**	**4/27/2005**	**4/28/2005**	**5/3/2005**	**5/24/2005**	**5/25/2005**	**5/26/2005**
Analyte	**Units**														
Residue, Filterable (EPA Method 160.1)															
TDS	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ion Chromatography (EPA Method 300.0)															
CHLORIDE	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE AS N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRITE AS N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Alkalinity (EPA Method 310.1)															
ALKALINITY	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrate (EPA Method 353.3)															
NITRATE-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen as Nitrite (EPA Method 354.1)	mg/L														
NITRITE AS N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals (EPA Method 6010B)															
CALCIUM	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IRON	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MAGNESIUM	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POTASSIUM	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SODIUM	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTIMONY	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (EPA Method 7470A)															
MERCURY	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (EPA Method 8260B)															
ACETONE	µg/L	NA	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 U	50 UJ	50 UJ
BENZENE	µg/L	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
BROMOFORM	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
BROMOMETHANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-BUTANONE	µg/L	NA	50 UJ	50 UJ	50 UJ	50 U	50 UJ	50 UJ	50 UJ	50 U	50 UJ	50 UJ	50 U	50 UJ	50 U
CARBON TETRACHLORIDE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number		**90-FP-112**	**90-028**	**90-029**	**90-030**	**90-031**	**90-032**	**90-055**	**90-056**	**90-057**	**90-059**	**90-061**	**90-076**	**90-077**	**90-078**
Sample Location		**MW-40-7**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**	**TRIP BLANK**
Sample Date		**9/15/2005**	**3/21/2005**	**3/22/2005**	**3/23/2005**	**3/24/2005**	**3/25/2005**	**4/25/2005**	**4/26/2005**	**4/27/2005**	**4/28/2005**	**5/3/2005**	**5/24/2005**	**5/25/2005**	**5/26/2005**
Analyte	**Units**														
1,2-DICHLOROETHANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,2-DICHLOROETHENE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TRANS-1,2-DICHLOROETHENE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROPROPANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ
ETHYLBENZENE	µg/L	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-HEXANONE	µg/L	NA	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
METHYL TERT-BUTYL ETHER	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-METHYL-2-PENTANONE	µg/L	NA	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
METHYLENE CHLORIDE	µg/L	NA	1 U	1 U	1 U	0.59 J	1 U	1 U	1 U	1 U	1 U	1 U	8	7.2	1.7
STYRENE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	µg/L	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-TRICHLOROETHANE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VINYL ACETATE	µg/L	NA	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 UJ	50 U	50 U	50 U	50 U	50 U
VINYL CHLORIDE	µg/L	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
XYLENES (TOTAL)	µg/L	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TOC (EPA Method 9060)															
TOTAL ORGANIC CARBON	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE-CL	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Measurements															
TEMPERATURE	C	24.29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ALKALINITY	mg/L	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHEMICAL OXYGEN DEMAND	mg/L	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	0.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IRON	mg/L	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE	mg/L	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OXIDATION REDUCTION POTENTIAL	MV	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED HYDROGEN	nM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PH	PH_UNITS	7.27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DIOXIDE	ppm	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SPECIFIC CONDUCTIVITY	µmhos/cm	2510	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HYDROGEN SULFIDE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Gases (Method RSK-175)															
CARBON DIOXIDE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHANE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

APPENDIX D

ANALYTICAL DATA – SUMMARY TABLE OF ALL GROUNDWATER ANALYTICAL DATA

Sample Number Sample Location Sample Date		90-080 TRIP BLANK 6/8/2005	90-092 TRIP BLANK 6/27/2005	90-093 TRIP BLANK 6/28/2005	90-097 TRIP BLANK 6/29/2005	90-105 TRIP BLANK 6/30/2005	90-113 TRIP BLANK 7/1/2005	90-119 TRIP BLANK 7/5/2005	90-126 TRIP BLANK 7/6/2005	90-130 TRIP BLANK 7/26/2005	90-136 TRIP BLANK 7/27/2005	90-144 TRIP BLANK 7/29/2005	90-149 TRIP BLANK 8/22/2005	90-156 TRIP BLANK 8/23/2005	90-164 TRIP BLANK 8/24/2005	90-175 TRIP BLANK 9/26/2005	90-180 TRIP BLANK 9/27/2005	90-189 TRIP BLANK 9/28/2005	90-197 TRIP BLANK 9/29/2005	90-204 TRIP BLANK 9/30/2005
Analyte	**Units**																			
VOCs (EPA Method 8260B)																				
ACETONE	µg/L	50 UJ	14 J	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
BENZENE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
BROMOFORM	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
BROMOMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-BUTANONE	µg/L	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
CARBON TETRACHLORIDE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,2-DICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TRANS-1,2-DICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROPROPANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-HEXANONE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
METHYL TERT-BUTYL ETHER	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-METHYL-2-PENTANONE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
METHYLENE CHLORIDE	µg/L	1 U	1 U	1 U	0.7 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.6 J	1 U	1 U	1 U	1 U	1 U
STYRENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	µg/L	0.5 U	25	0.5 U	0.5 U	0.5 U	2.3	0.42 J	1.3	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.39 J	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-TRICHLOROETHANE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VINYL ACETATE	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
VINYL CHLORIDE	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
XYLENES (TOTAL)	µg/L	1 U	0.36 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

Notes:

C - Celsius
COD - chemical oxygen demand
EPA - U.S. Enviornmental Protection Agency
FD - field duplicate
J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter
µmhos/cm - micromhos per centimeter
MV - megavolt
NA - not available
nM - nanometer
ppm - parts per million
SVOC - semivolatile organic compound
TDS - total dissolved solids
TOC - total organic carbon
U - not detected at or above reporting limit
VOC - volatile organic compound

APPENDIX E

LABORATORY REPORTS, CHAIN-OF-CUSTODY RECORDS, AND RAW FIELD DATA

APPENDIX E-1

LABORATORY REPORTS AND CHAIN-OF-CUSTODY RECORDS

APPENDIX E-2

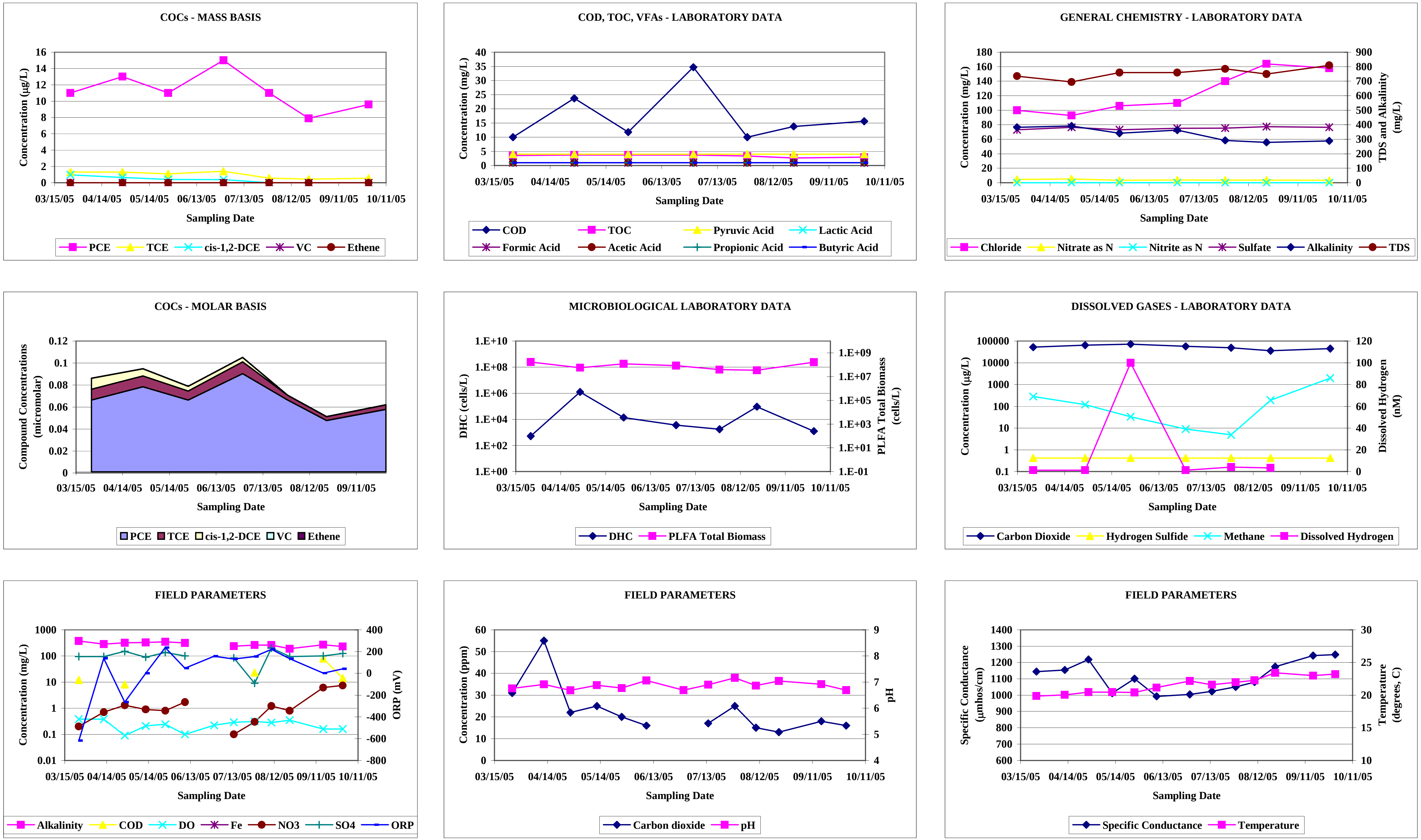
RAW FIELD DATA

APPENDIX F

SELECT MONITORING PARAMETER TRENDS (WELLS MW-40-02, -14, -22, AND -30 THROUGH -39)

APPENDIX F

LIST OF FIGURES



Note: Non-detect values are plotted using zero for VOCs, and detection limits for the other parameters.

NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

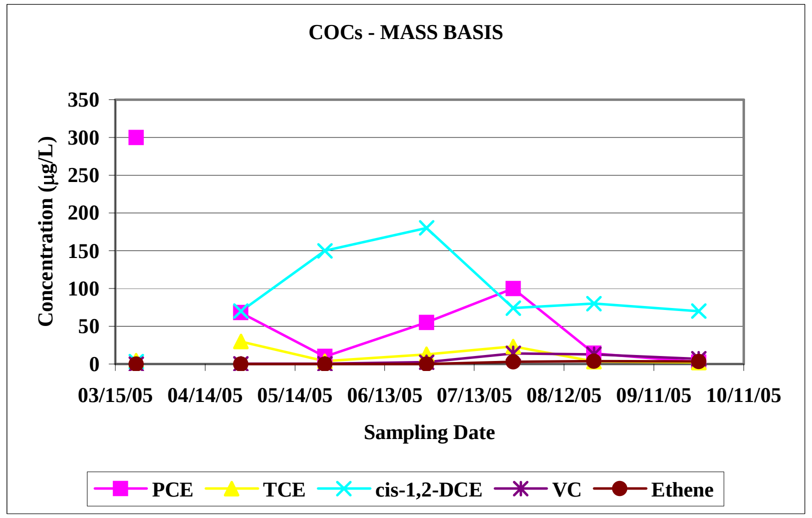
Figure F-1
SELECT MONITORING PARAMETER TRENDS WELL MW-40-02 (MARCH THROUGH SEPTEMBER 2005)

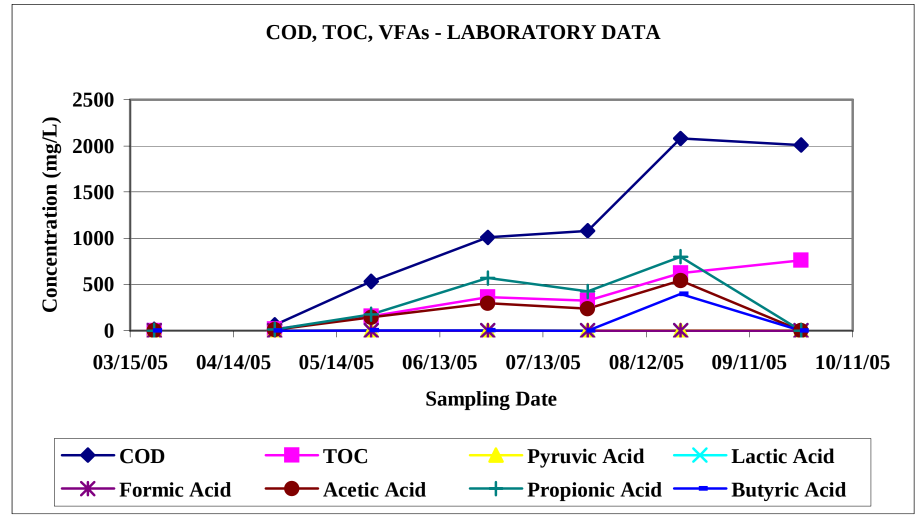
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

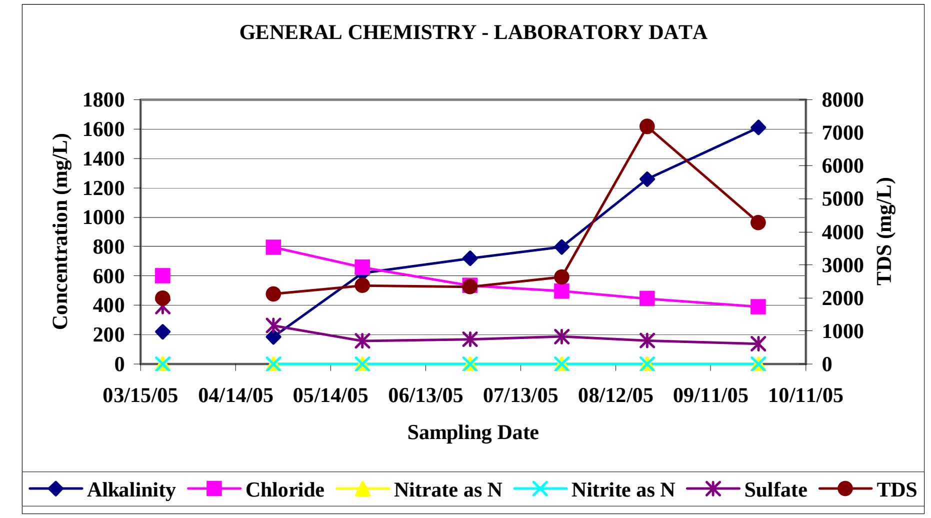
TETRA TECH EC, INC.

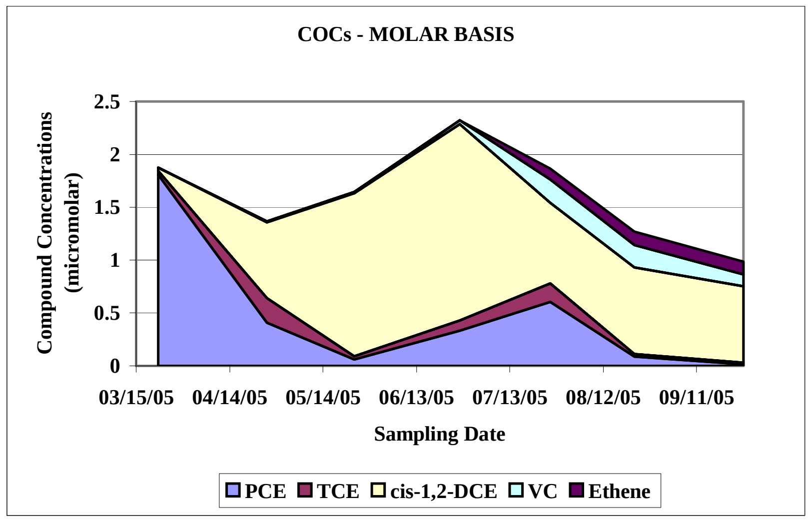
DRAWING NO: 060169F1.DWG
DCN: FWSD-RAC-06-0169 CTO: #0090
APPROVED BY: HH
CHECKED BY: MT REV: REVISION 0
DRAWN BY: MD DATE: 11/30/05

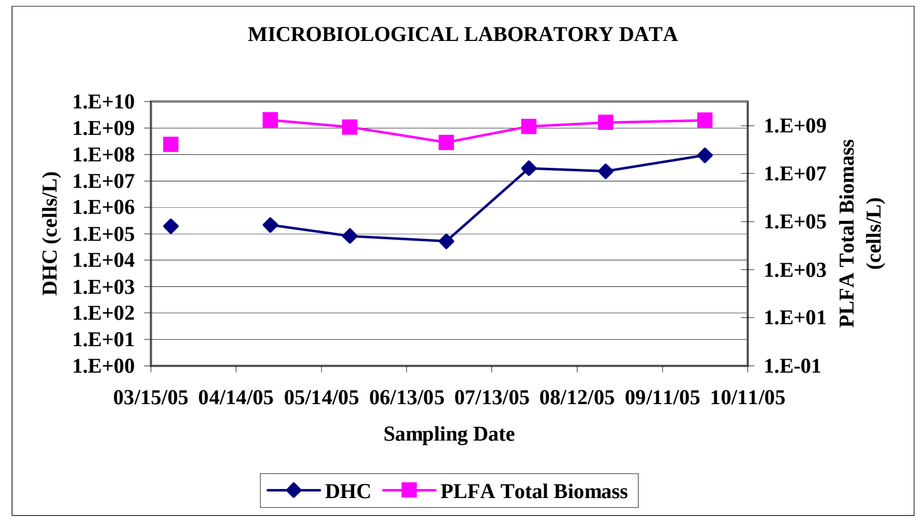
P:\1990-RAC\CTO-0090\DWG\051652\APPENDIX F\051652F1.DWG
PLOT/UPDATE: NOV 05 2005 13:06:02

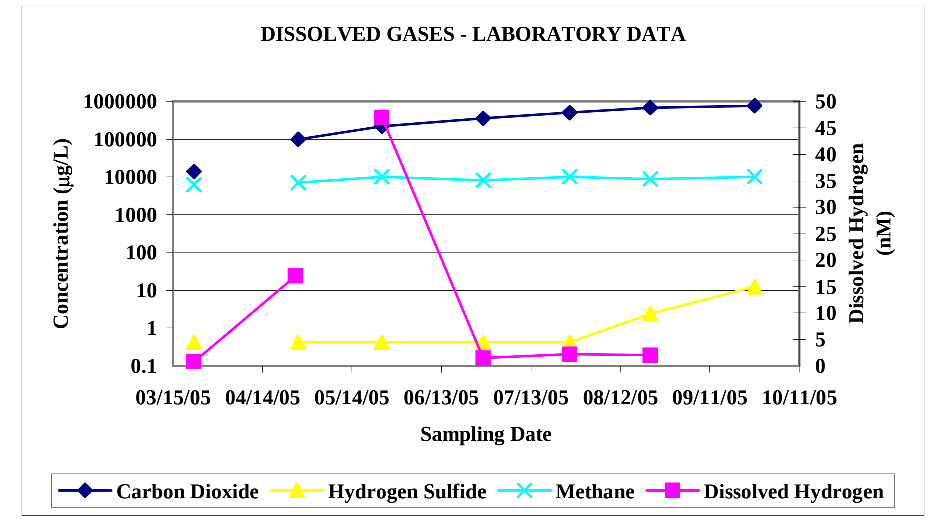


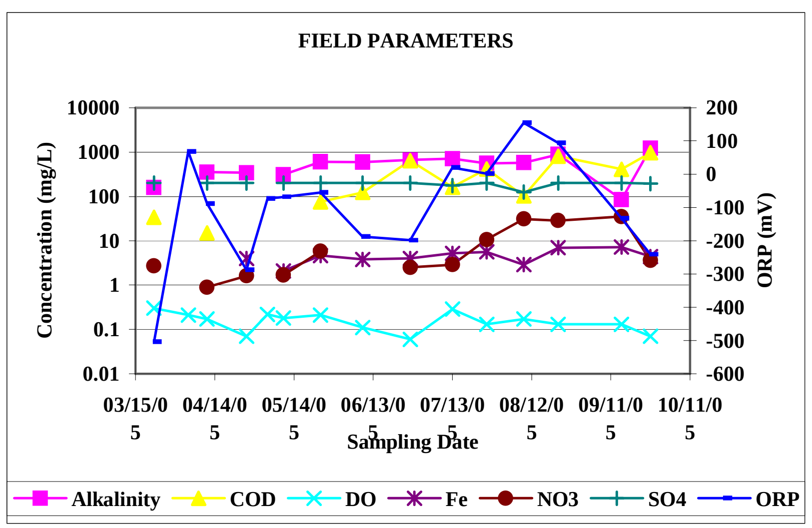


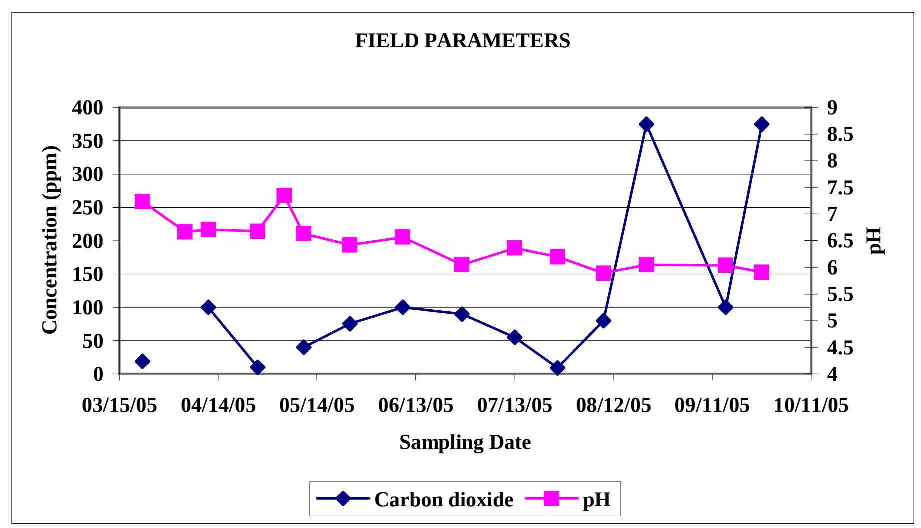


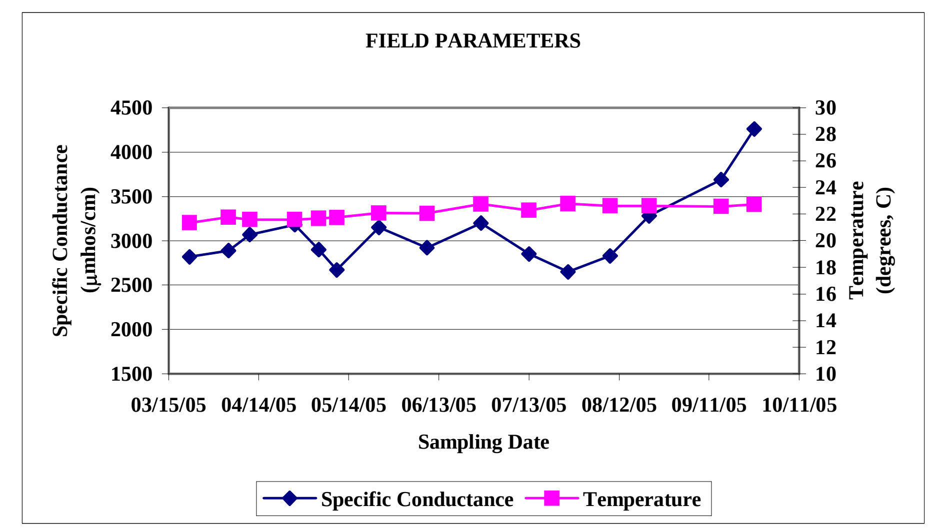












Note: Non-detect values are plotted using zero for VOCs, and detection limits for the other parameters.

NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-2

SELECT MONITORING PARAMETER TRENDS WELL MW-40-14 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169F2.DWG
DCN: FWSD-RAC-06-0169 CTO: #0090
APPROVED BY: HH
CHECKED BY: MT REV: REVISION 0
DRAWN BY: MD DATE: 11/30/05

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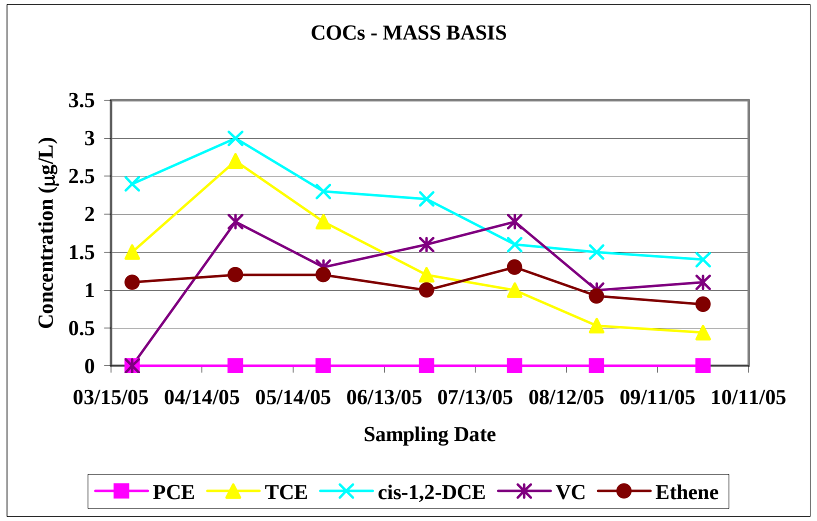
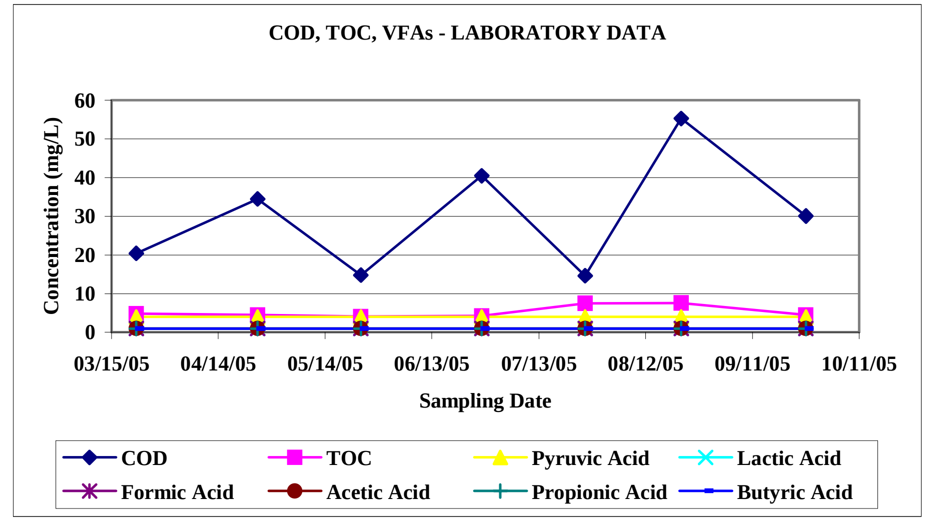
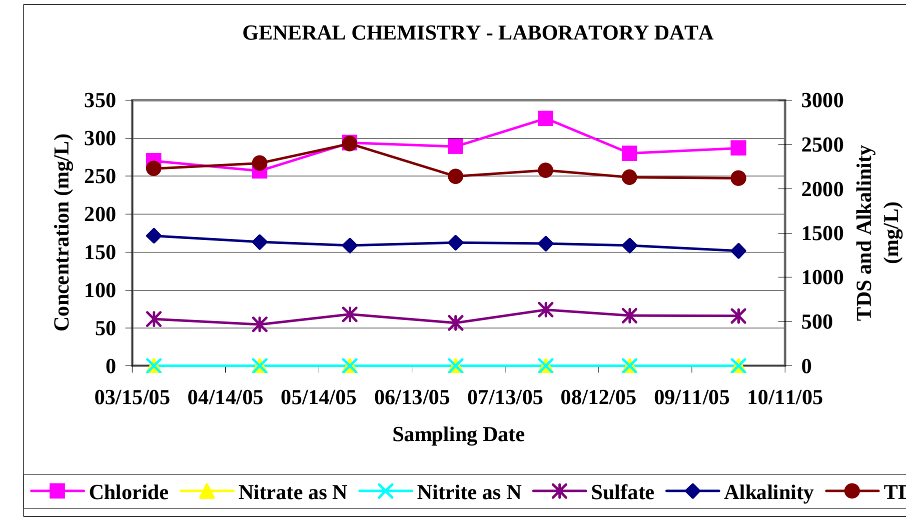
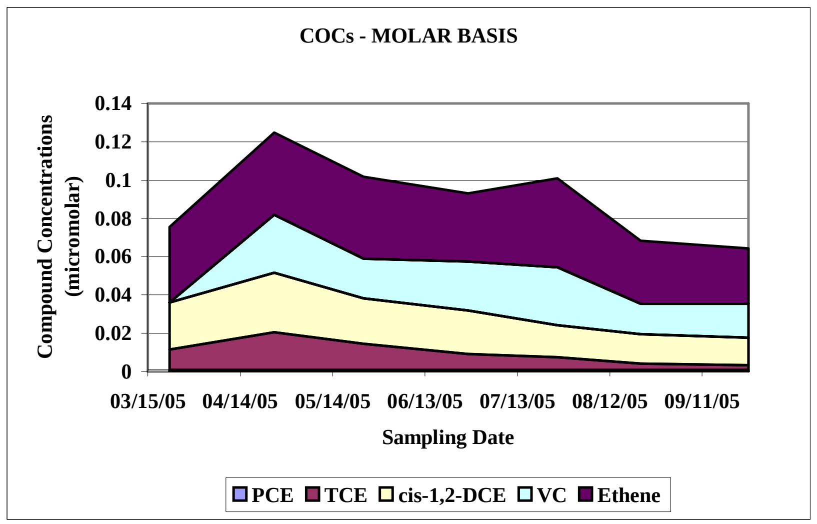
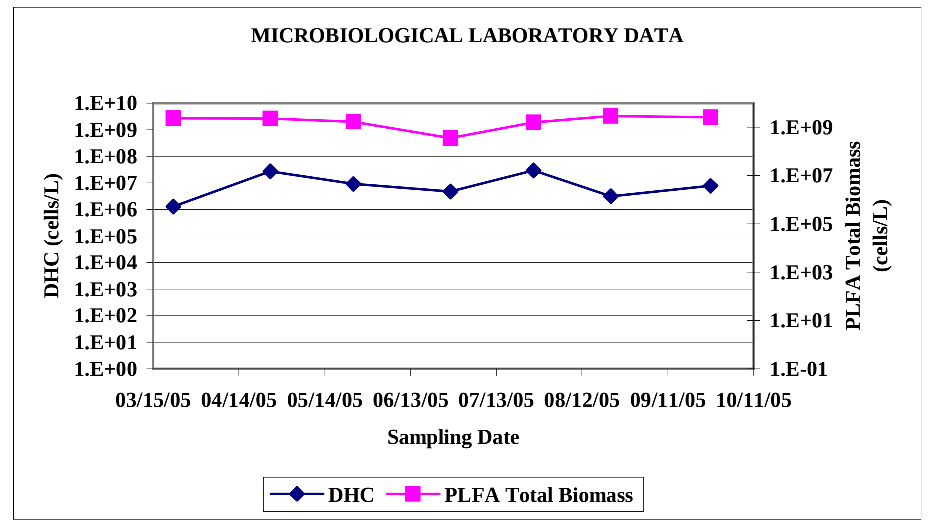
PLOT/UPDATE: NOV 15 2005 12:54:38

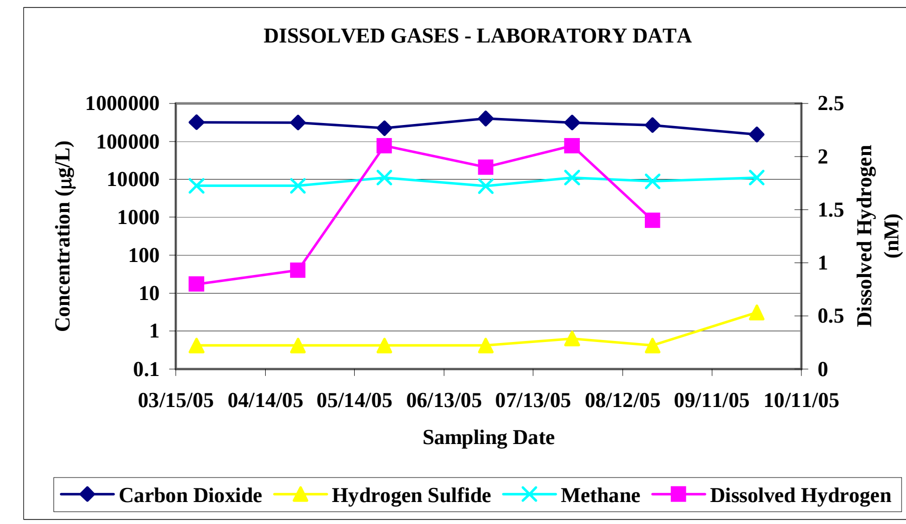


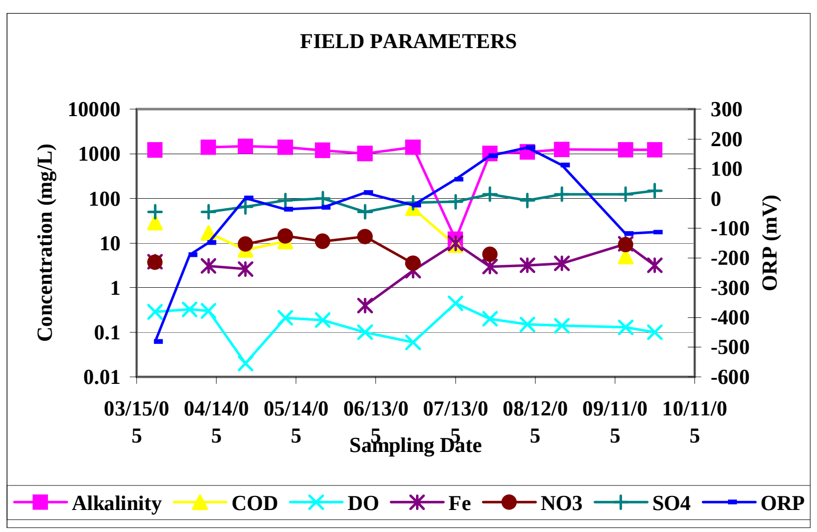


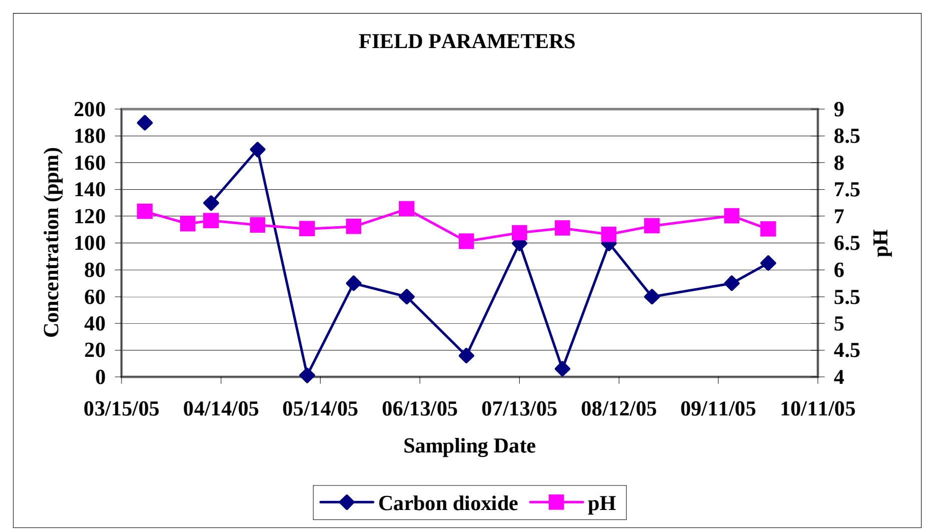


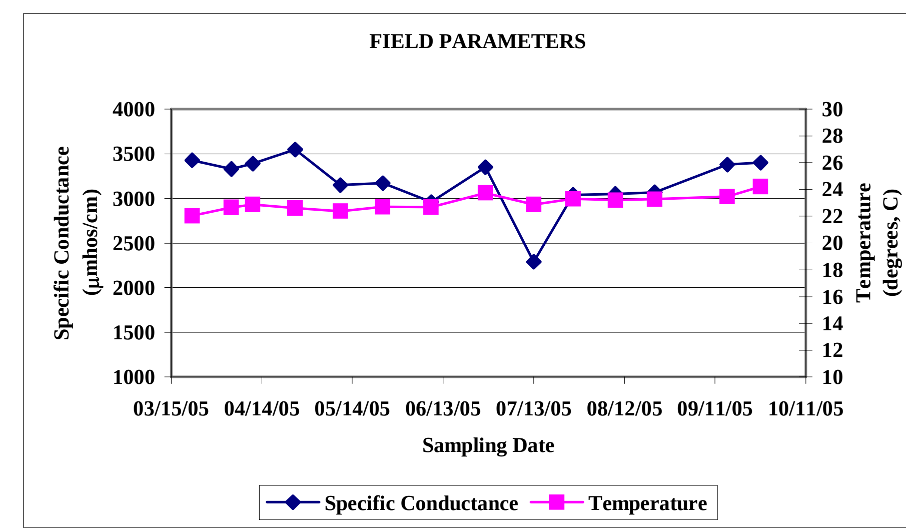












Note: Non-detect values are plotted using zero for VOCs, and detection limits for the other parameters.

NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-3

SELECT MONITORING PARAMETER TRENDS
WELL MW-40-22 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169F3.DWG
DCN: FWSD-RAC-06-0169 CTO: #0090
APPROVED BY: HH
CHECKED BY: MT REV: REVISION 0
DRAWN BY: MD DATE: 11/30/05

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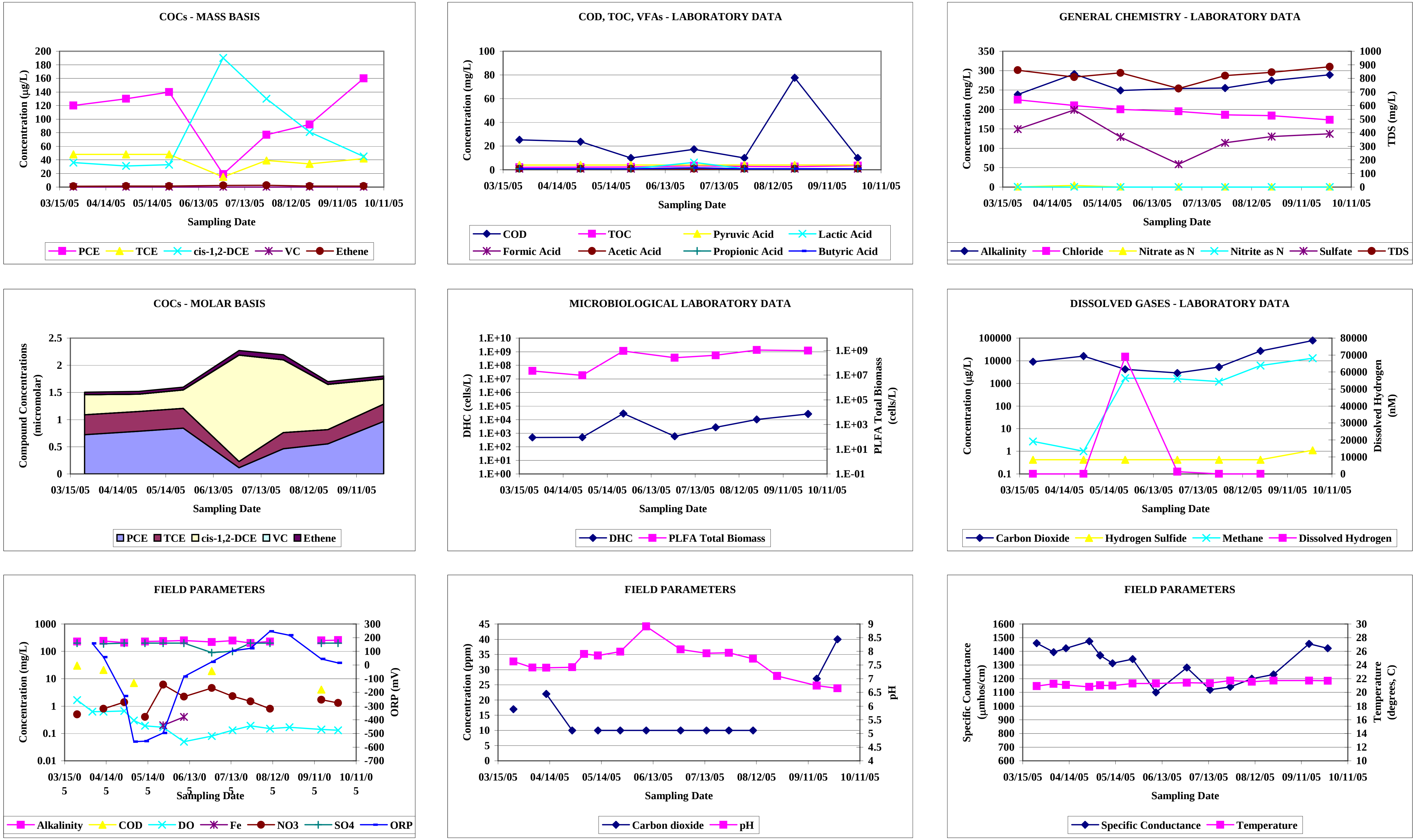

Note: Non-detect values are plotted using zero for VOCs, and detection limits for the other parameters.

NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-4
SELECT MONITORING PARAMETER TRENDS
WELL MW-40-30 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169F4.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MT
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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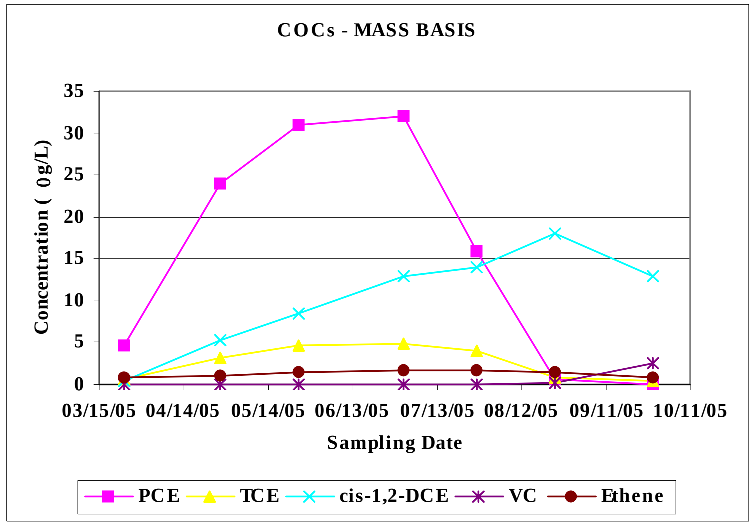

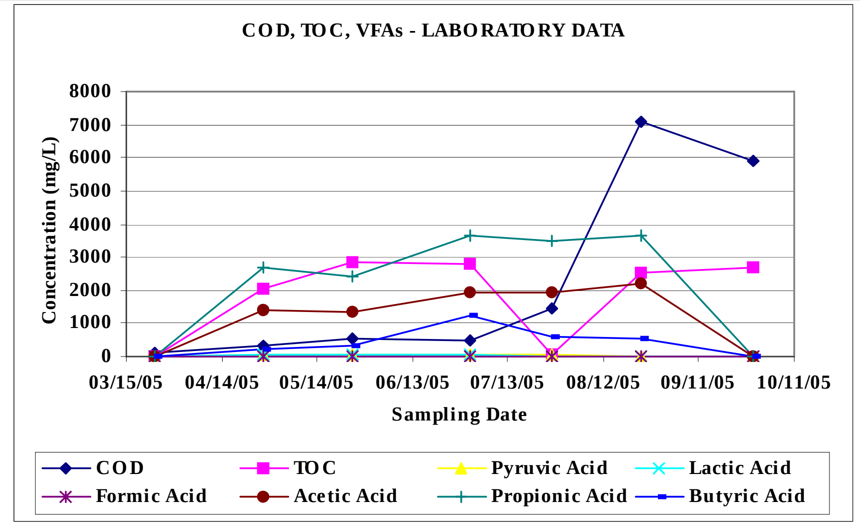

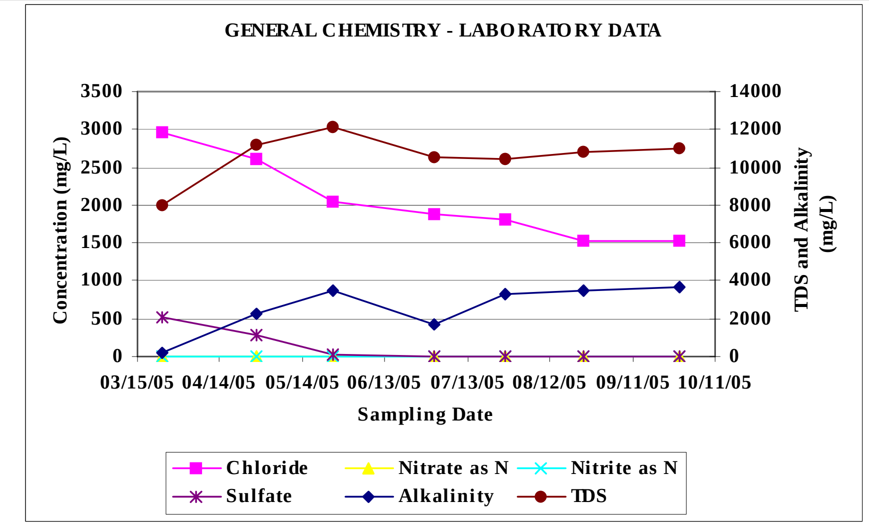

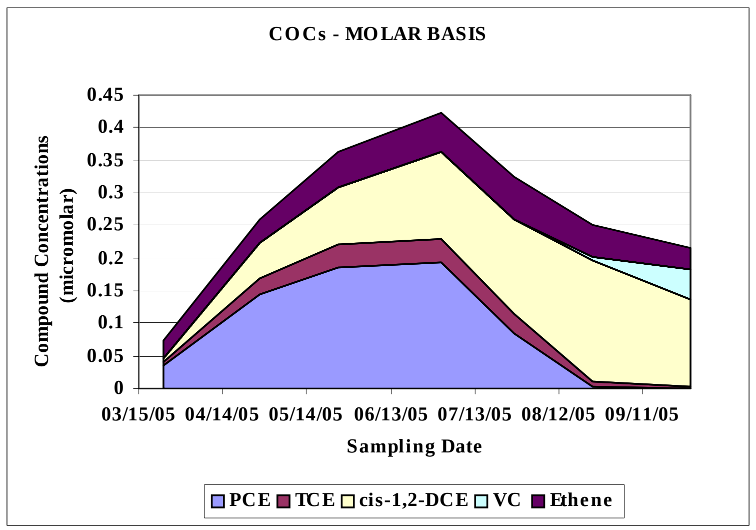

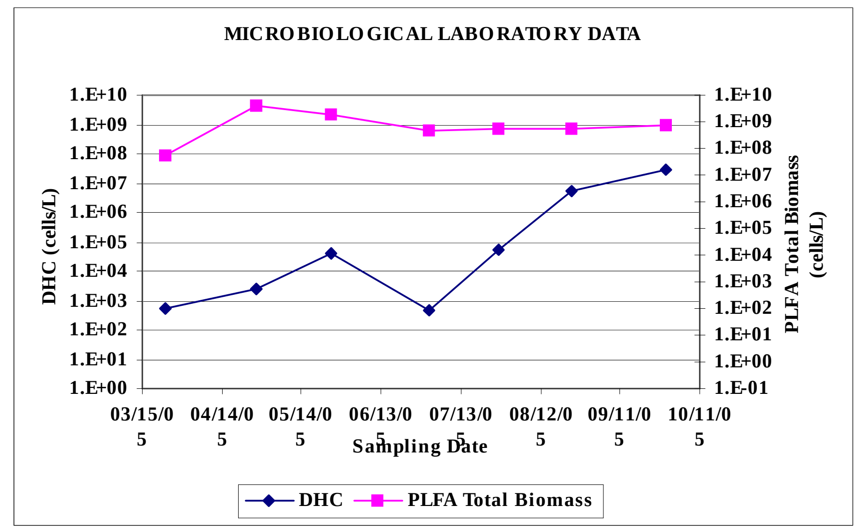

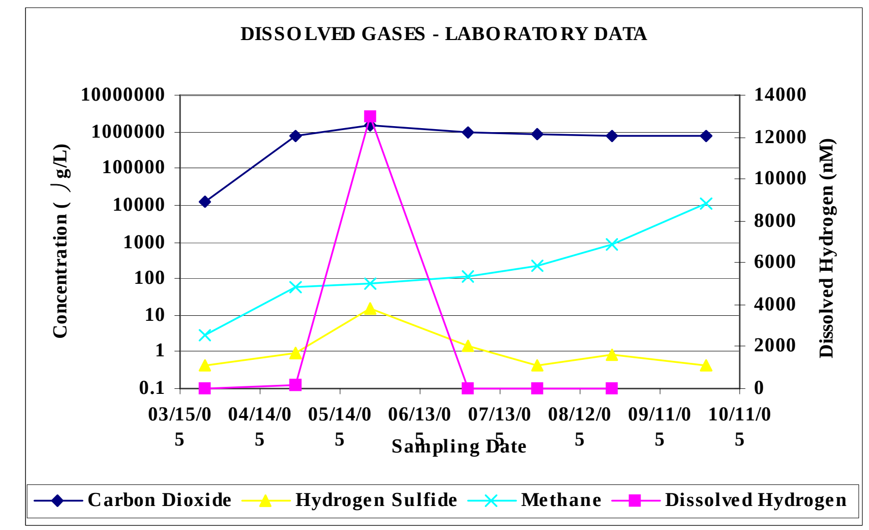

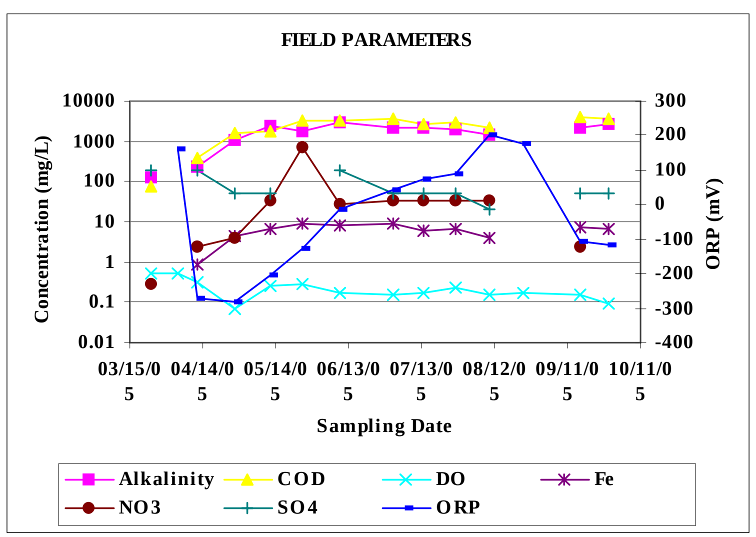

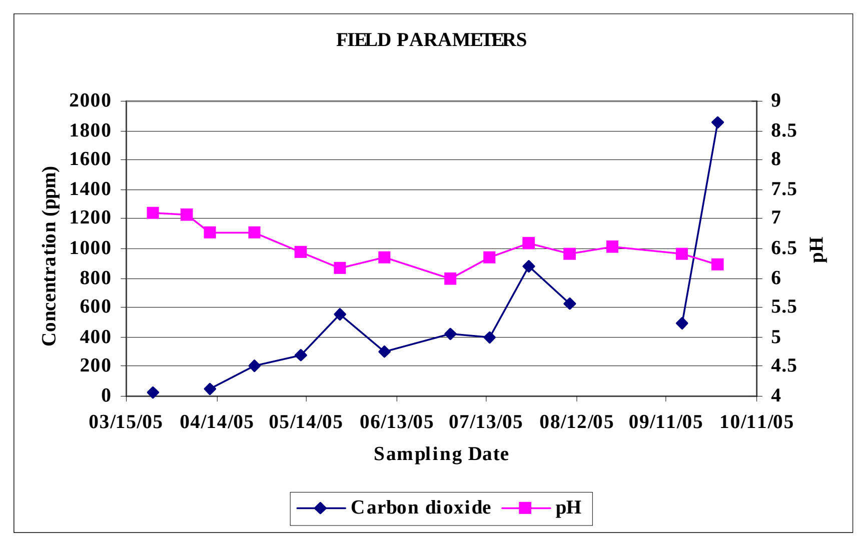

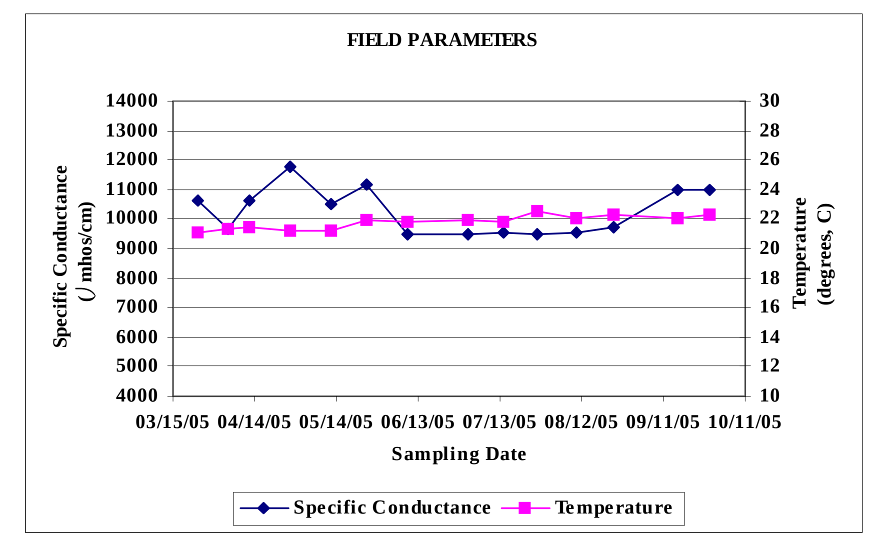

NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-5
SELECT MONITORING PARAMETER TRENDS
WELL MW-40-31 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169F5.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MT
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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PLOT/UPDATE: NOV 15 2005 12:58:58

DRAWING NO: 060169F6.DWG

DCN: FWSD-RAC-06-0169

CTO: #0090

APPROVED BY: HH

CHECKED BY: MT

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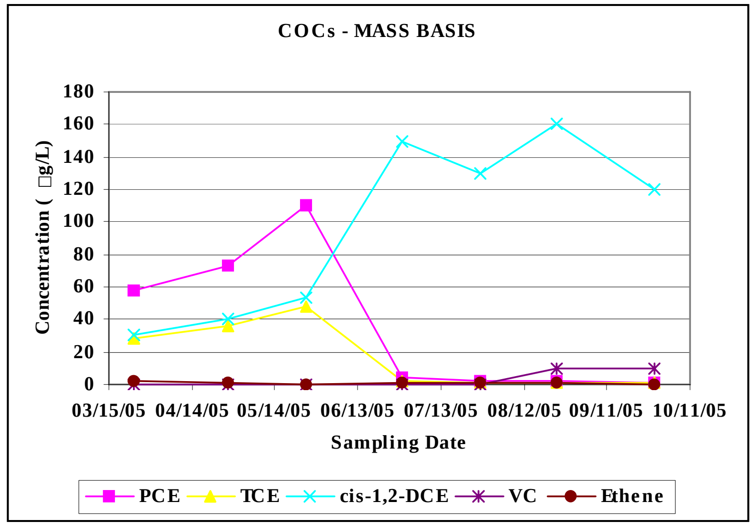
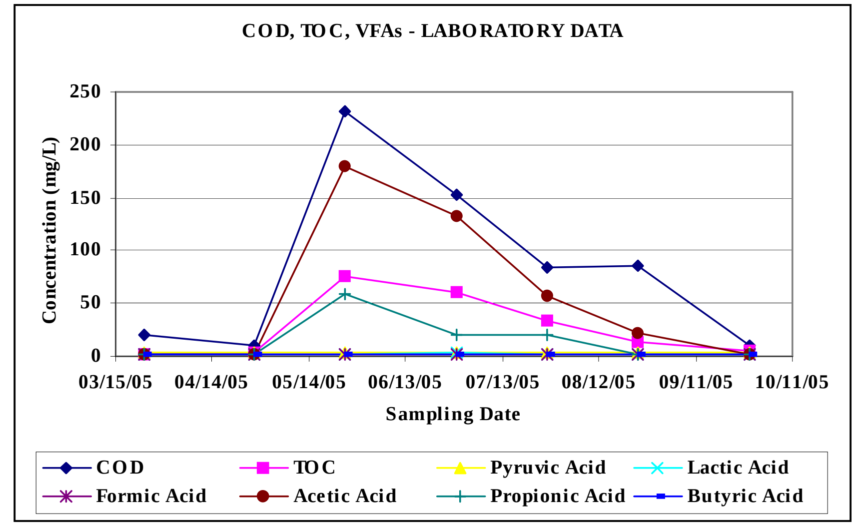
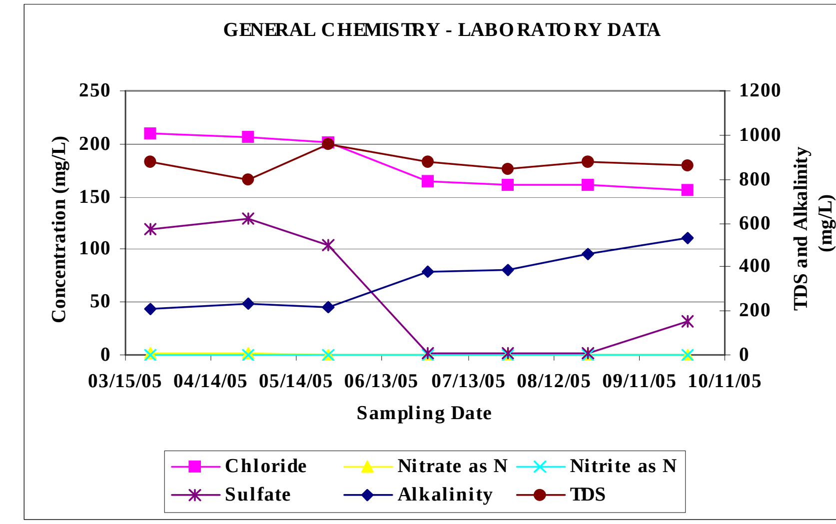
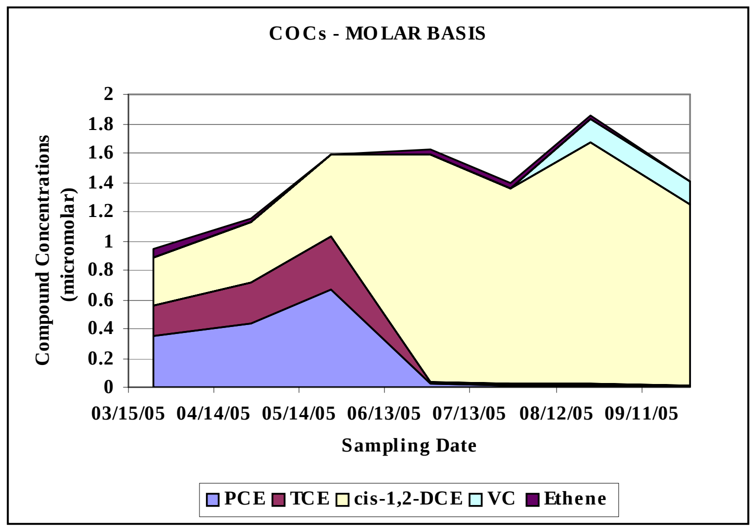
DRAWN BY: MD

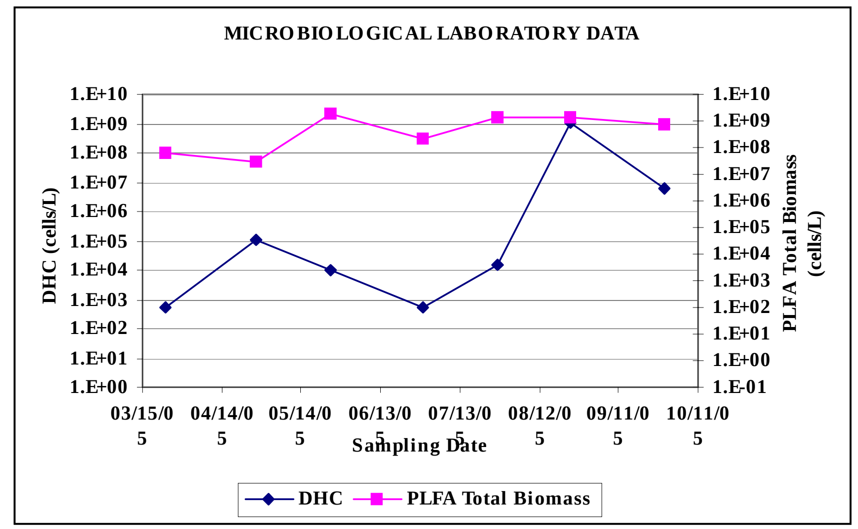
DATE: 11/30/05

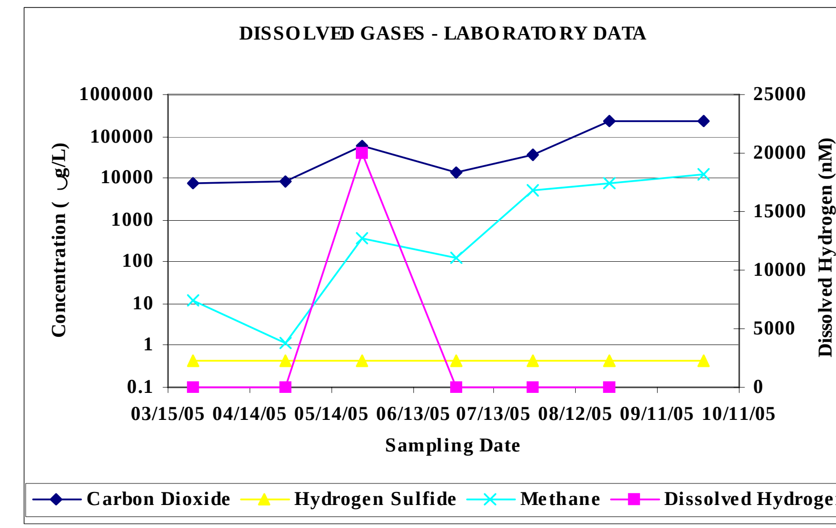


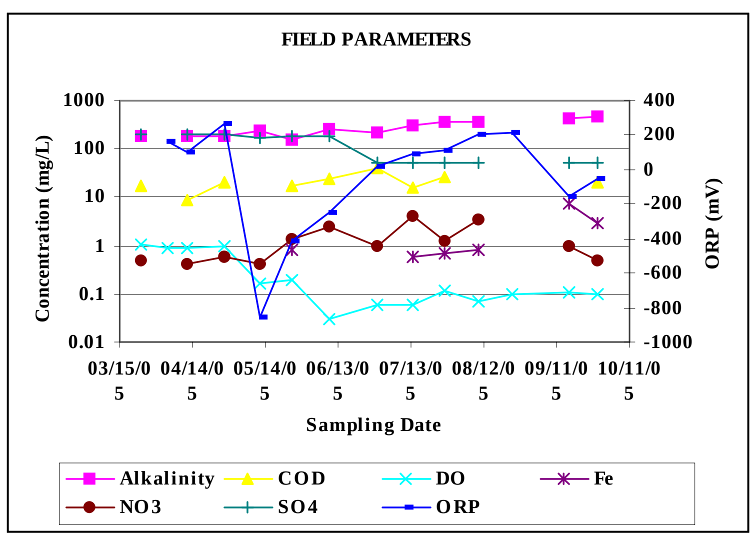


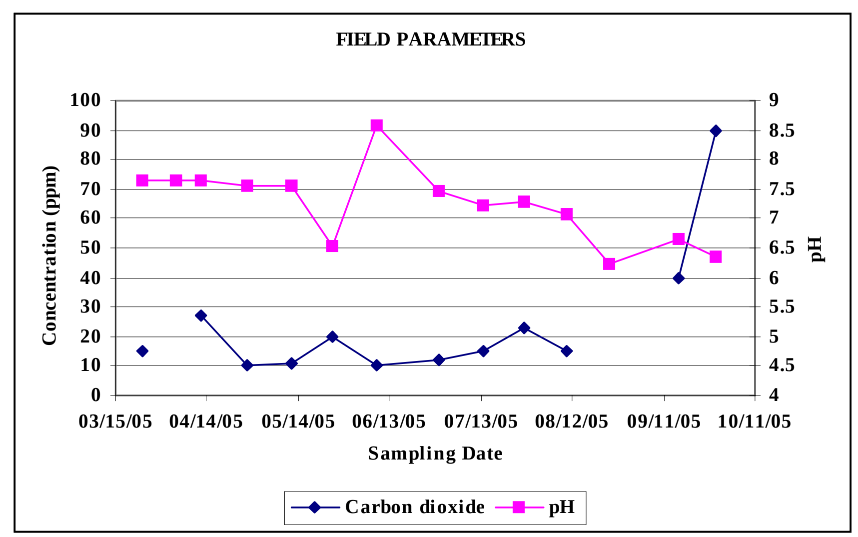


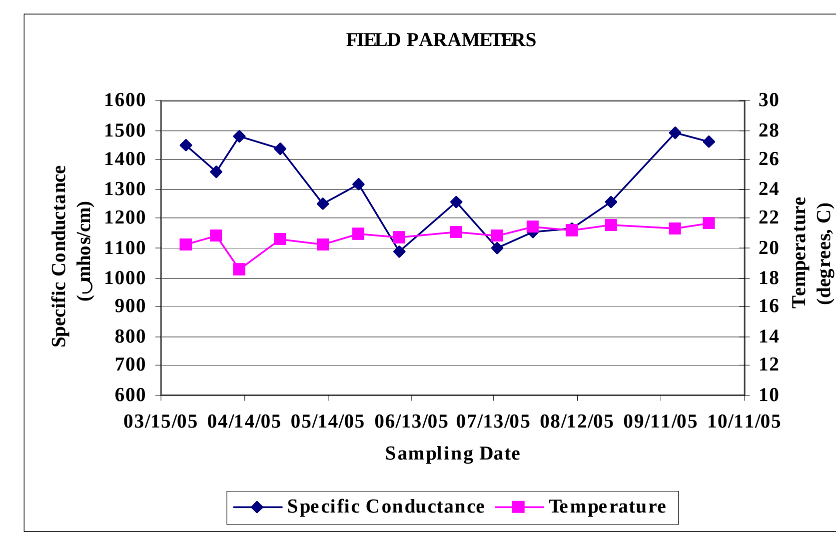












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PLOT/UPDATE: NOV 15 2005 13:01:40

NOTE:

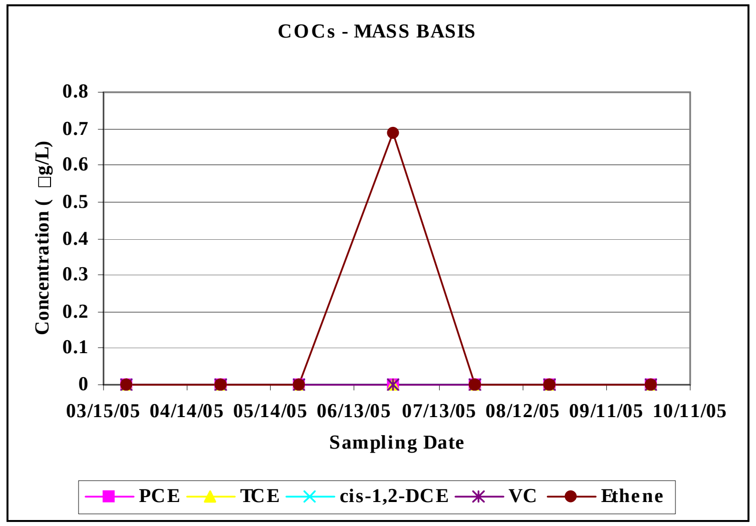
IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

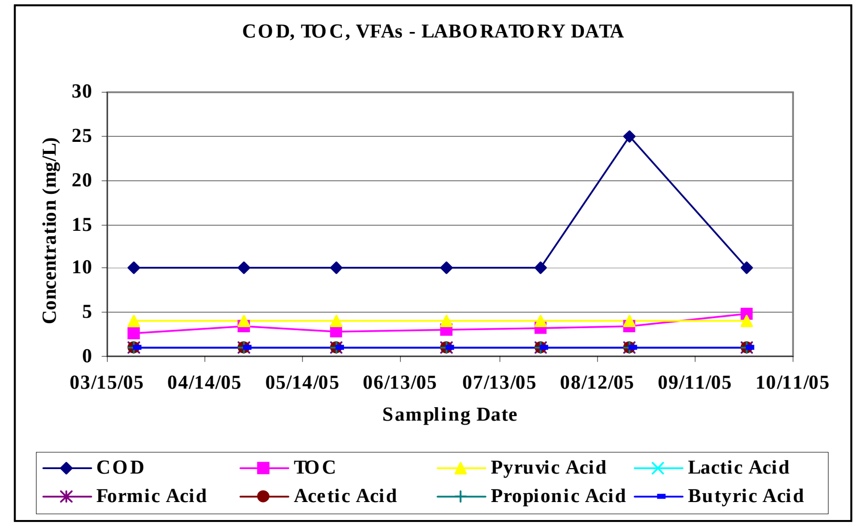
Figure F-6

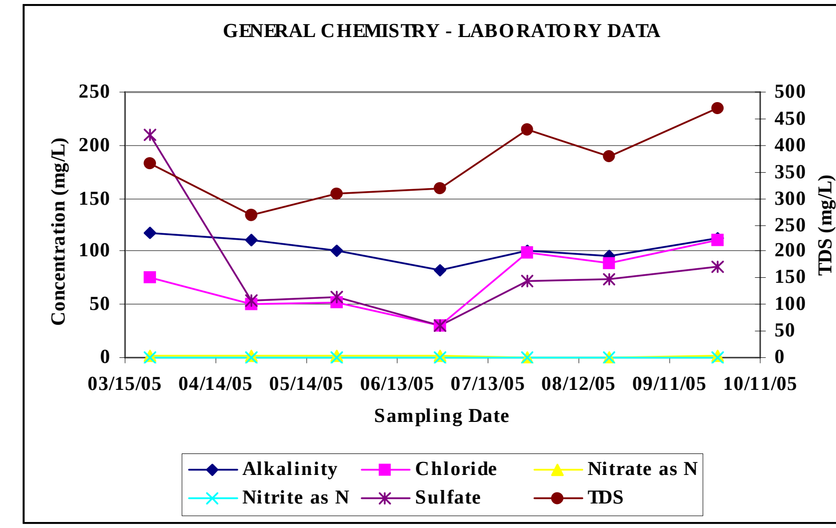
SELECT MONITORING PARAMETER TRENDS
WELL MW-40-32 (MARCH THROUGH SEPTEMBER 2005)

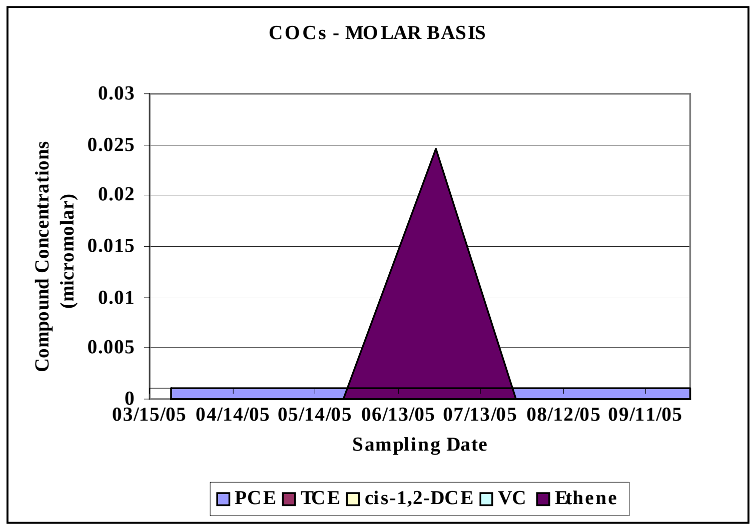
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

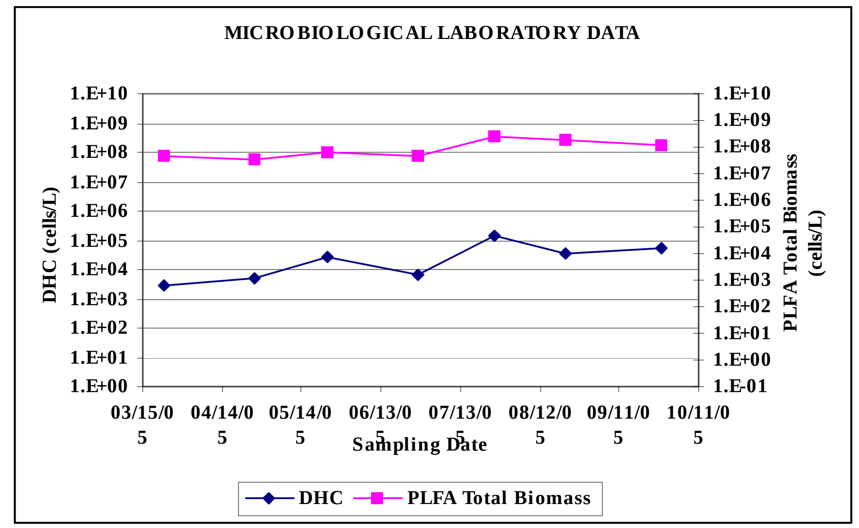
TETRA TECH EC, INC.

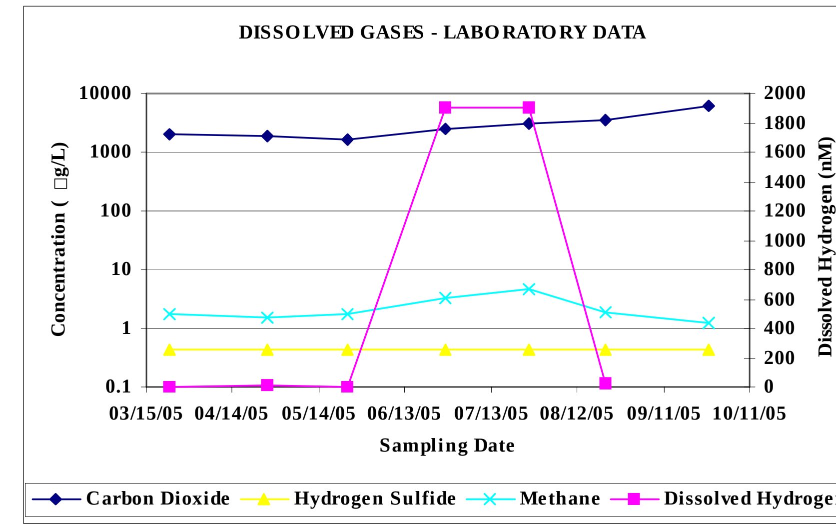


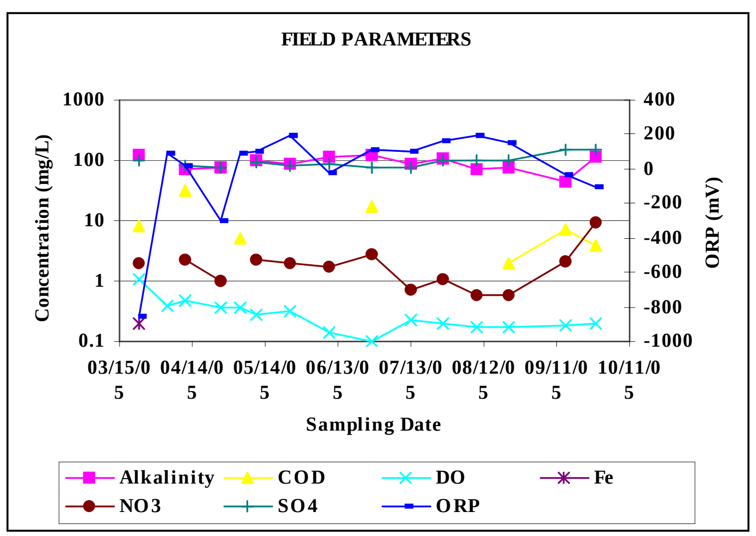


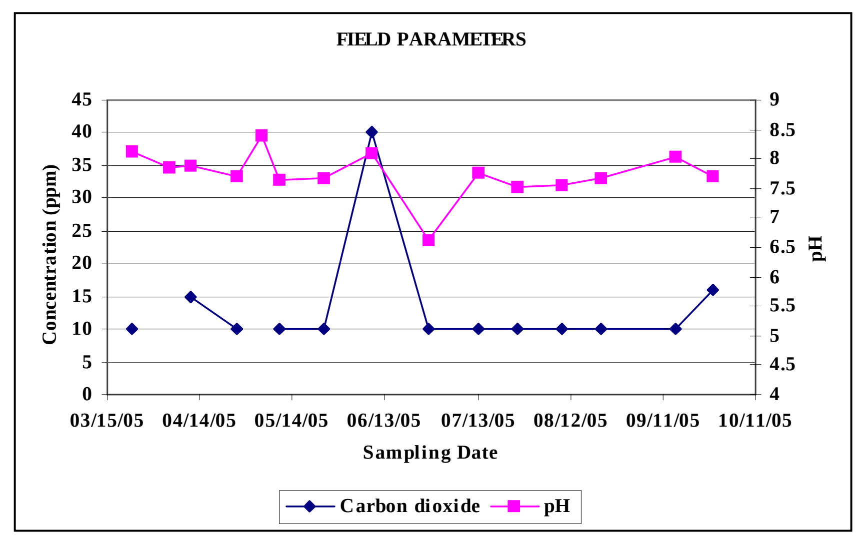


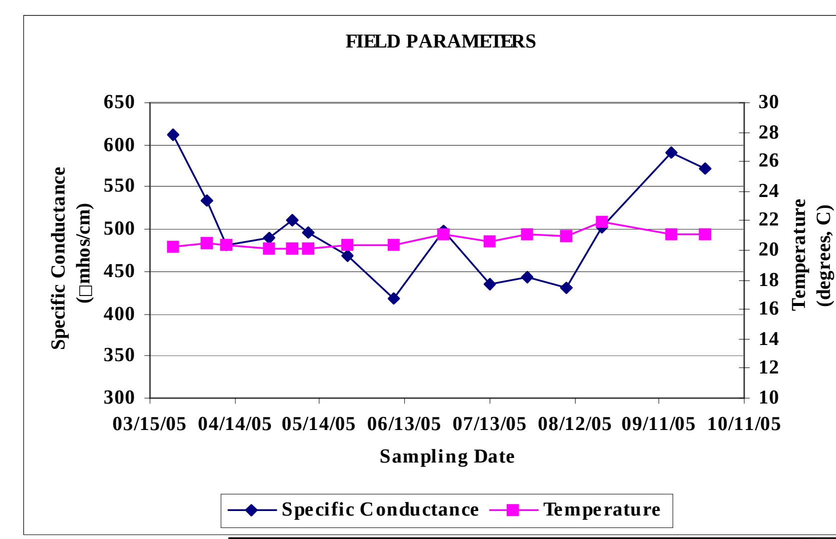












NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-7

SELECT MONITORING PARAMETER TRENDS
WELL MW-40-33 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169F7.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MT
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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PLOT/UPDATE: NOV 15 2005 13:04:02

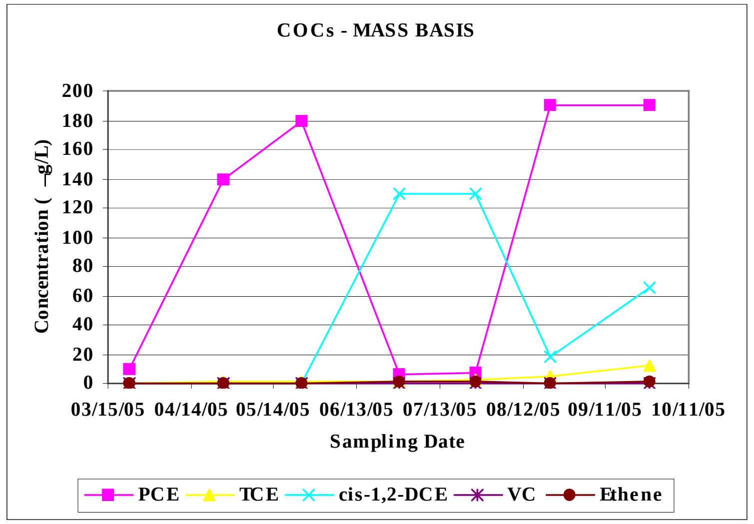
DRAWING NO: 060169F8.DWG

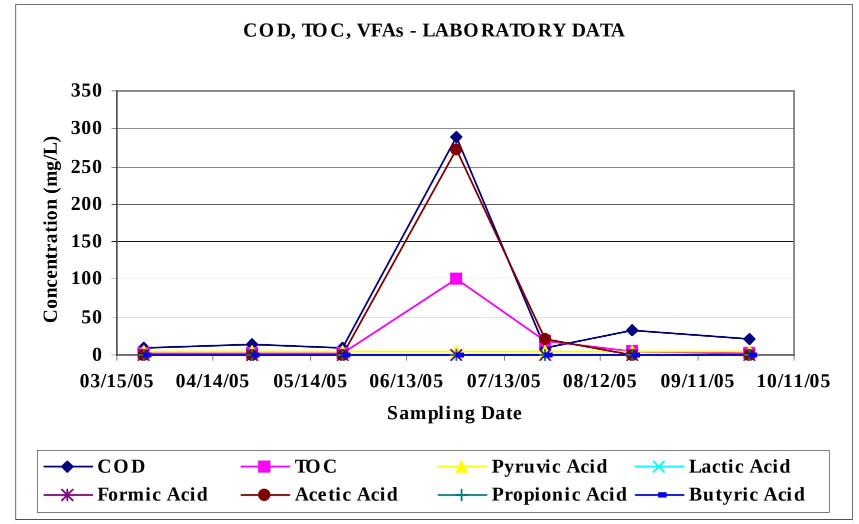
DCN: FWSD-RAC-06-0169 CTO: #0090

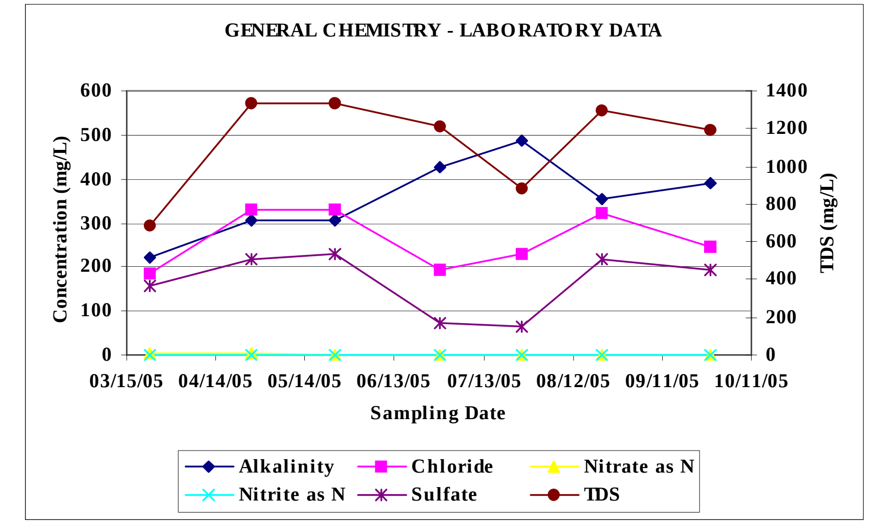
APPROVED BY: HH

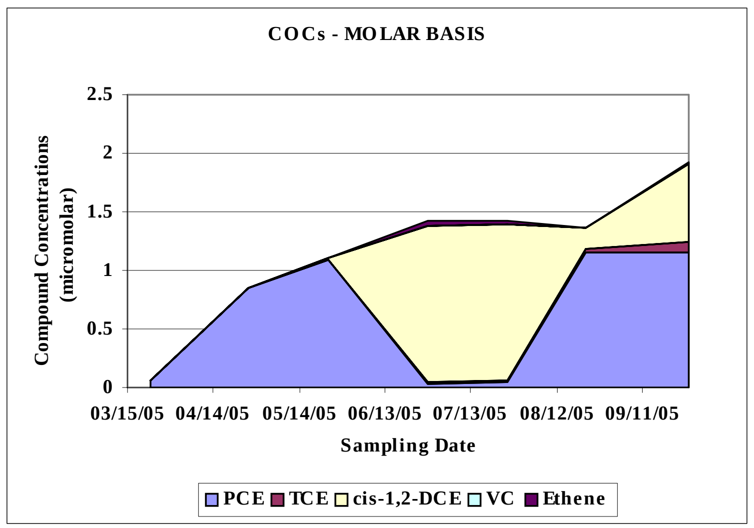
CHECKED BY: MT REV: REVISION 0

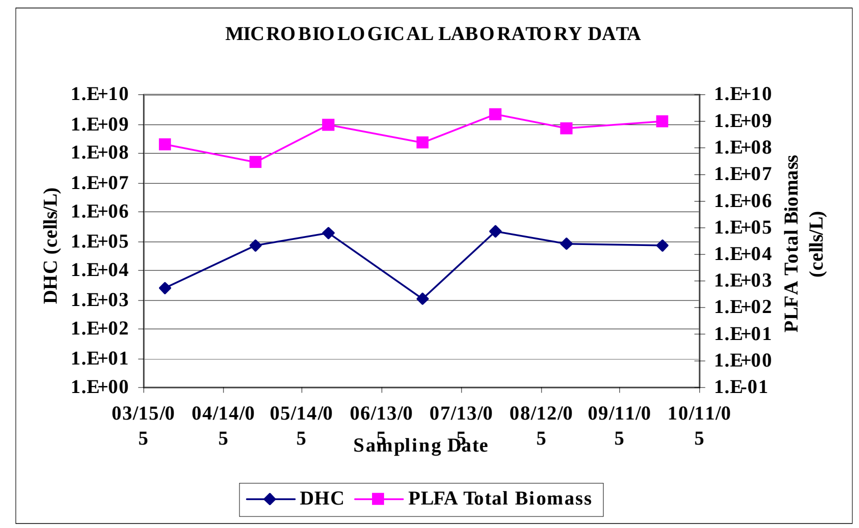
DRAWN BY: MD DATE: 11/30/05

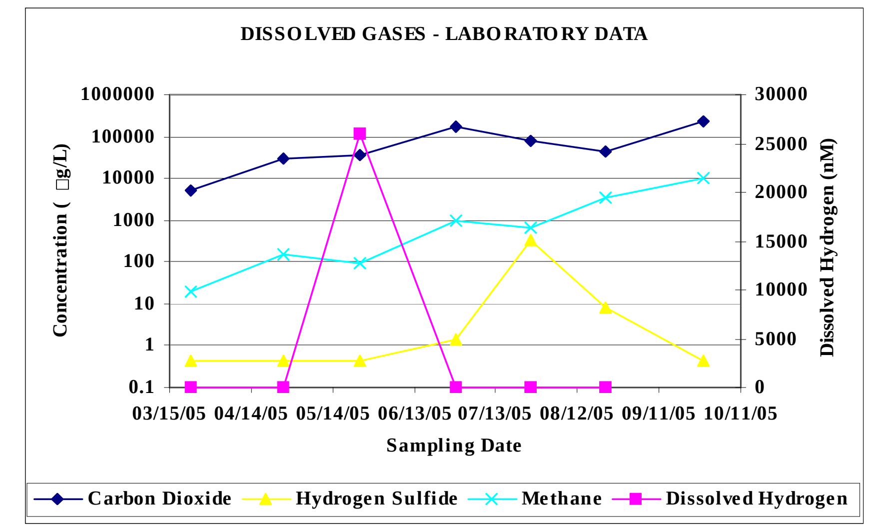


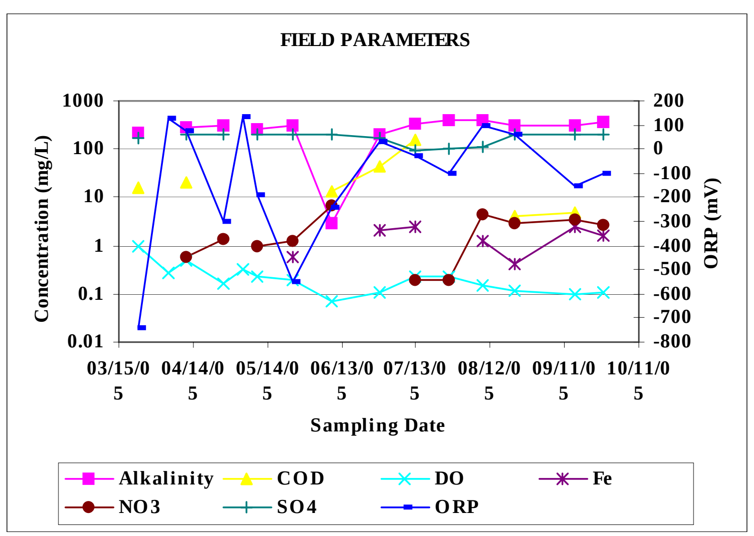


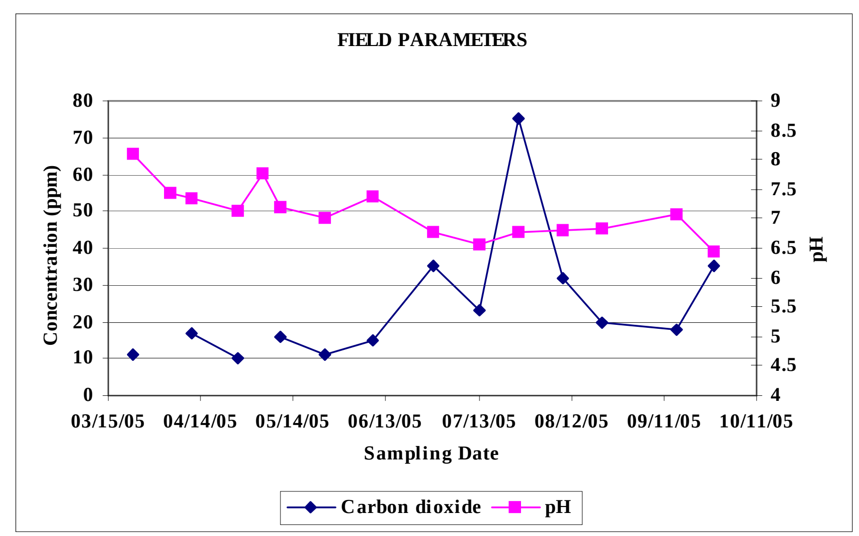


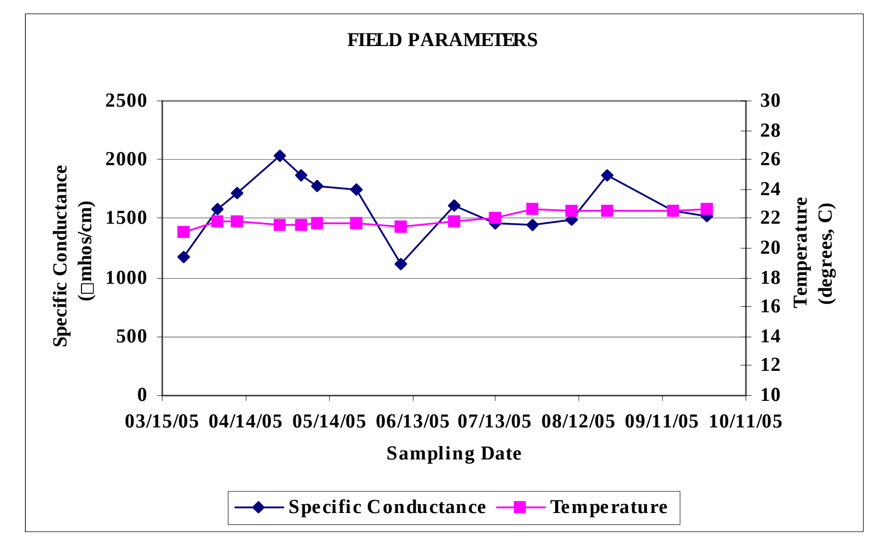












NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-8

SELECT MONITORING PARAMETER TRENDS WELL MW-40-34 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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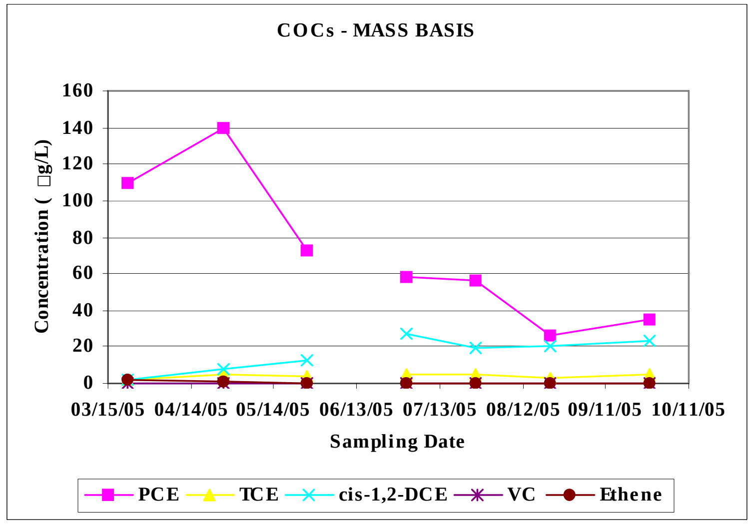
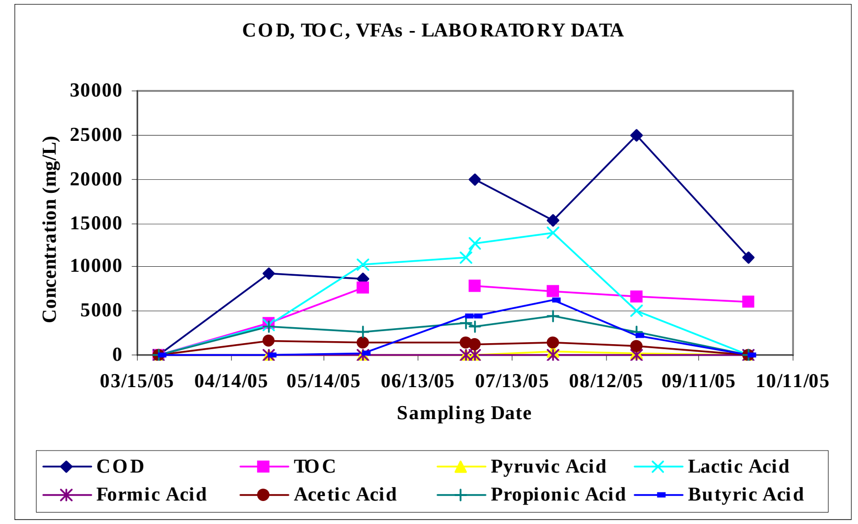
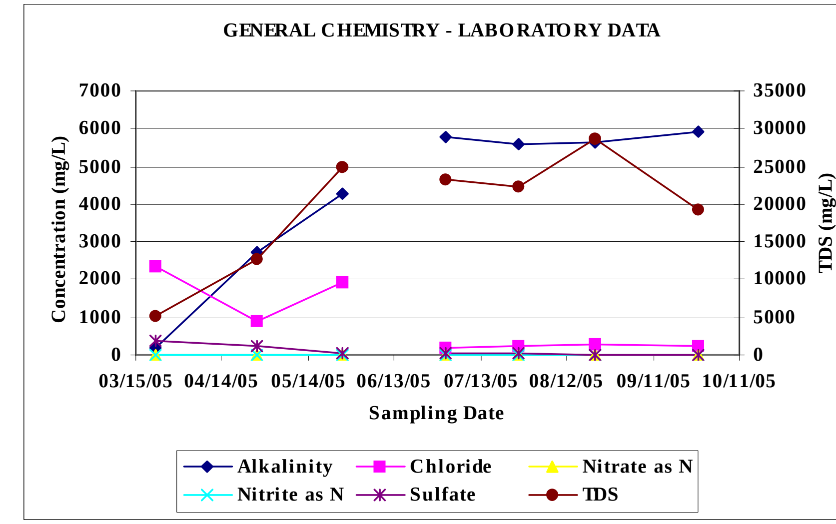
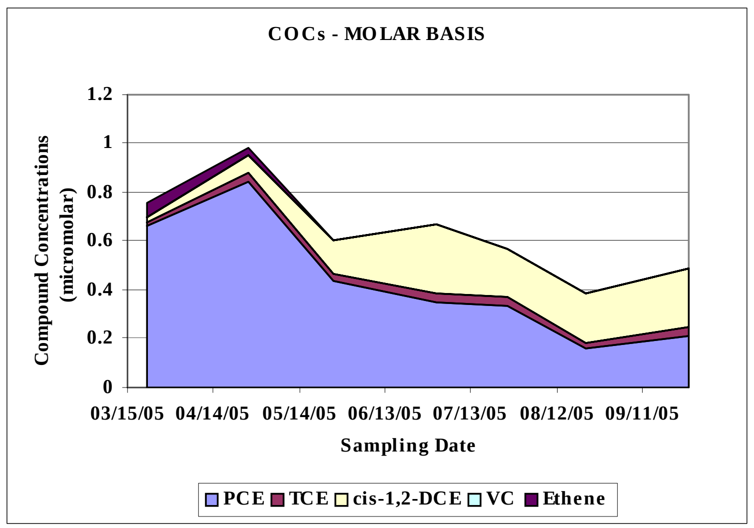
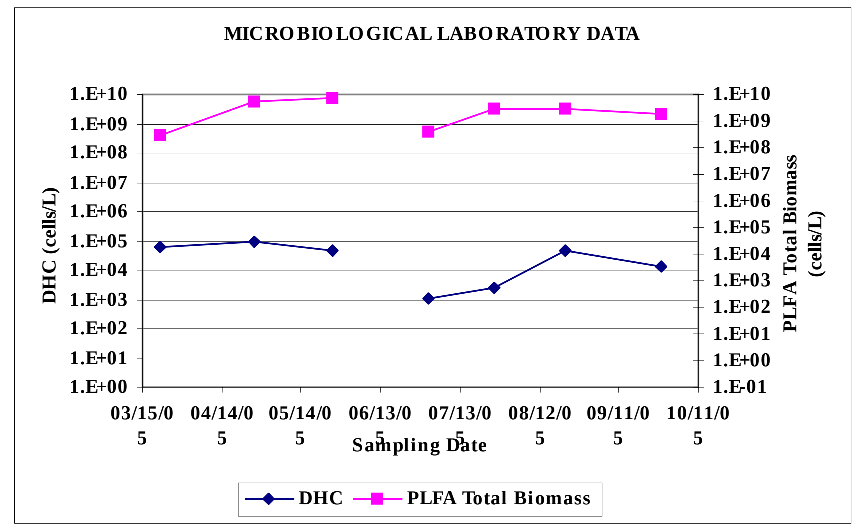
PLOT/UPDATE: NOV 15 2005 13:04:31

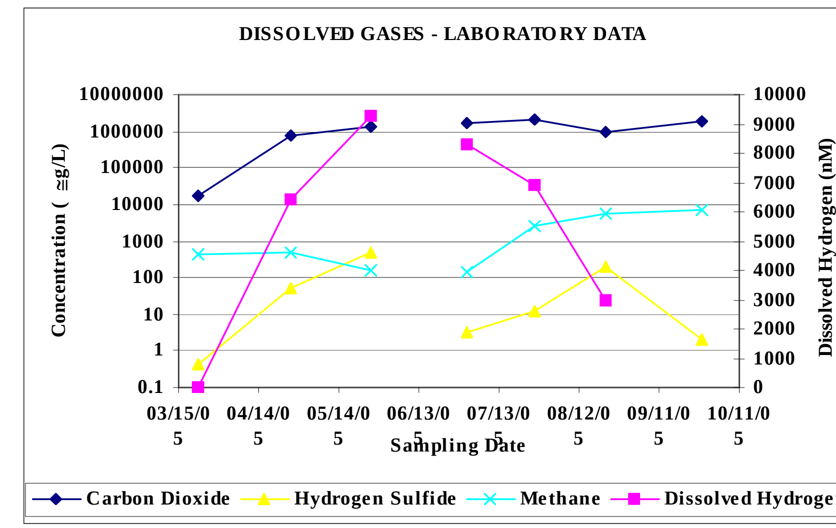


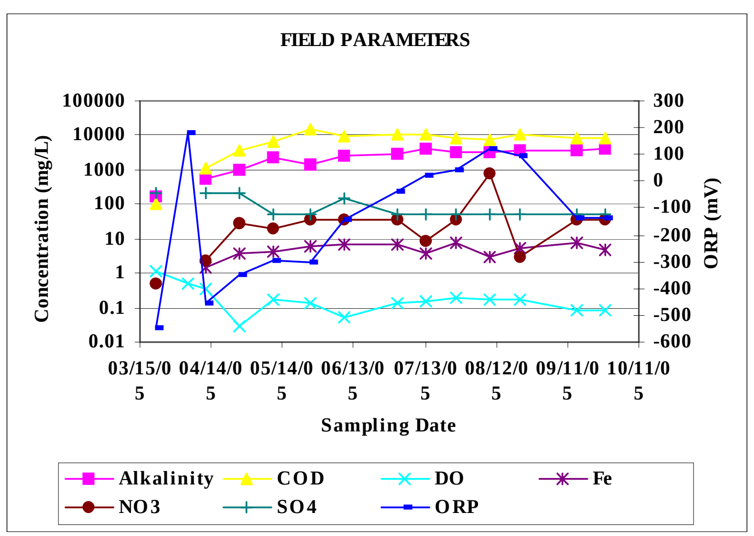


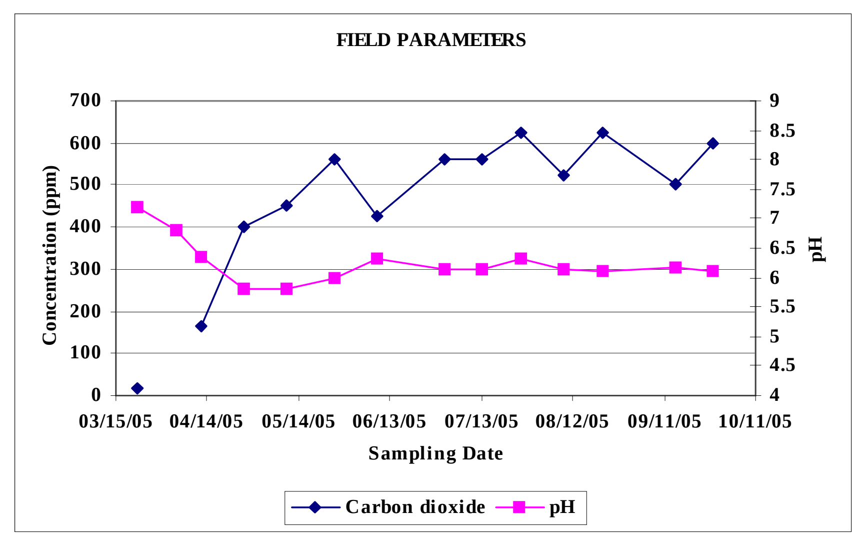


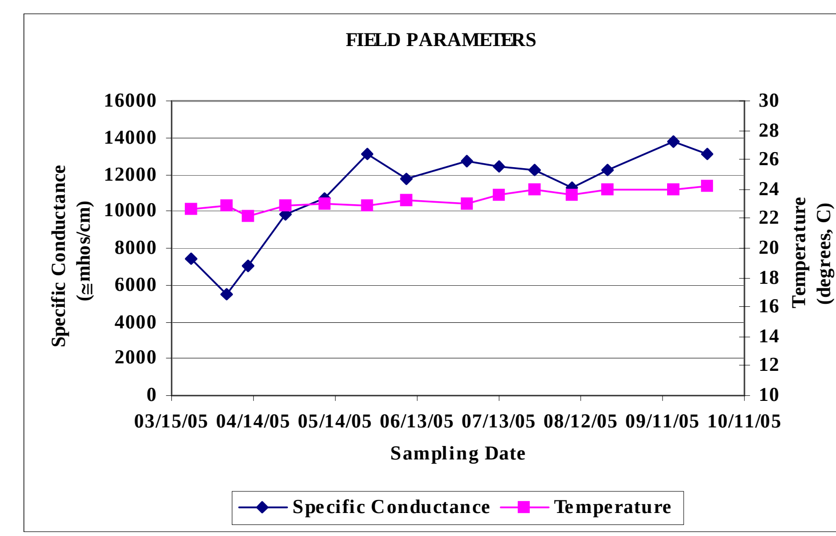












NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-9

SELECT MONITORING PARAMETER TRENDS
WELL MW-40-35 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169F9.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MT
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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PLOT/UPDATE: NOV 15 2005 13:07:50

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DCN: FWSD-RAC-06-0169

CTO: #0090

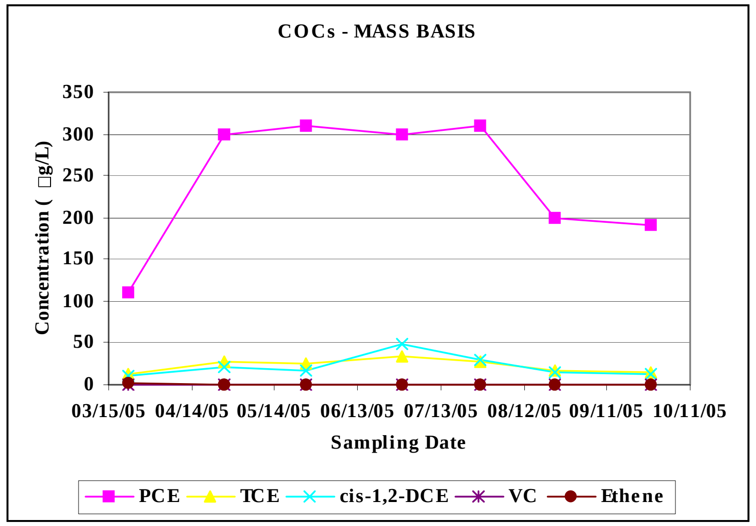
APPROVED BY: HH

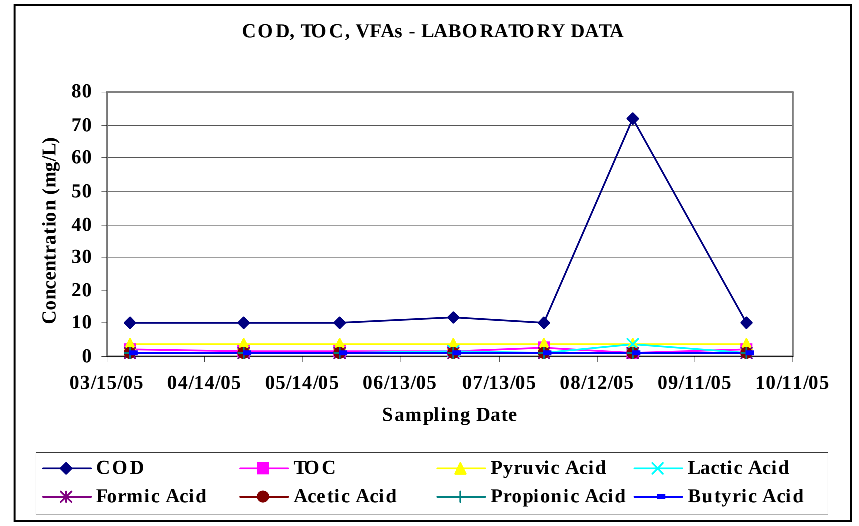
CHECKED BY: MT

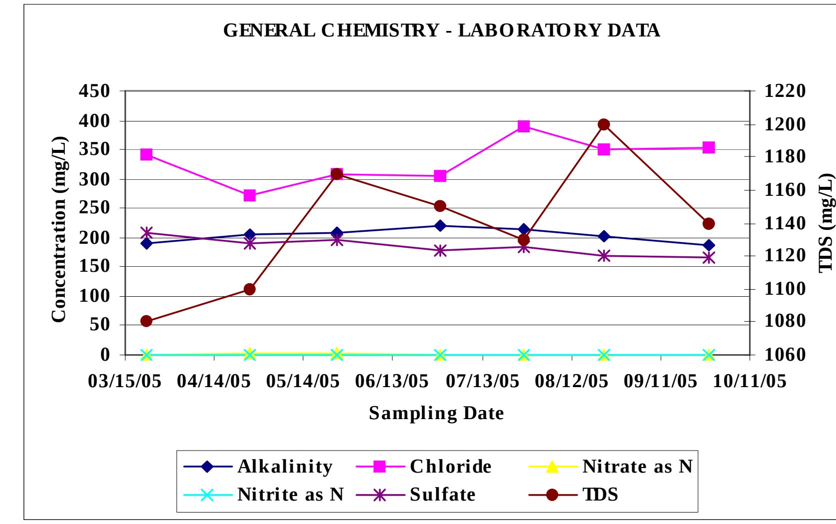
REV: REVISION 0

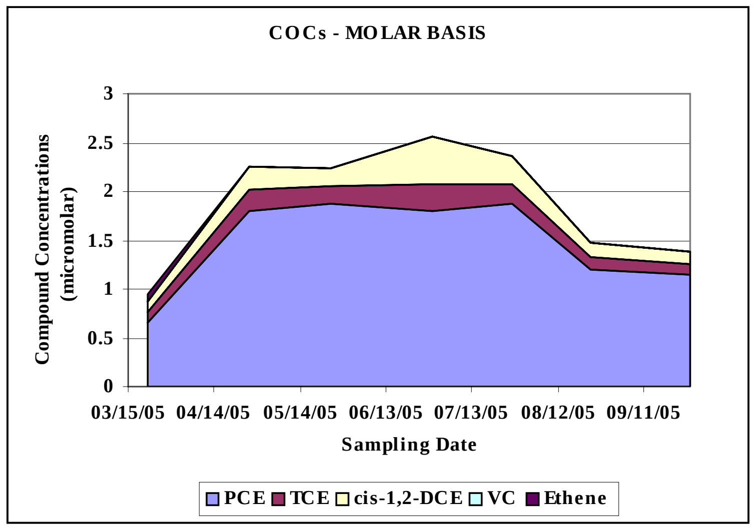
DRAWN BY: MD

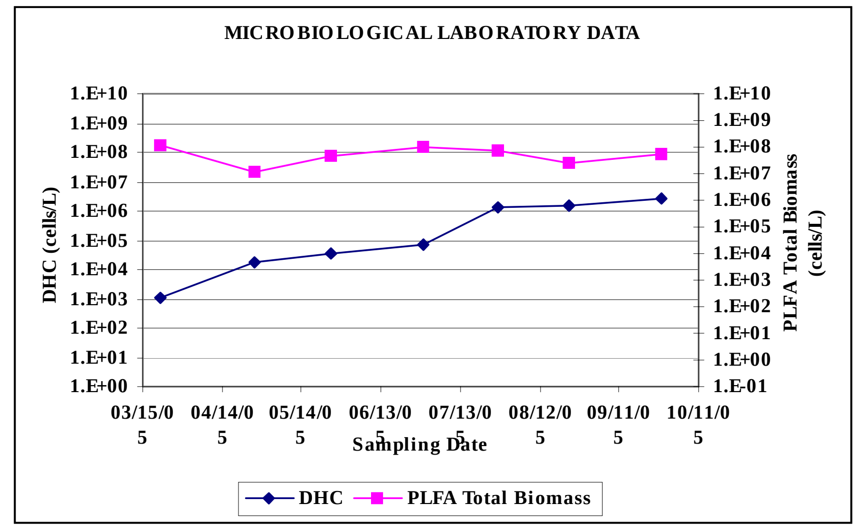
DATE: 11/30/05

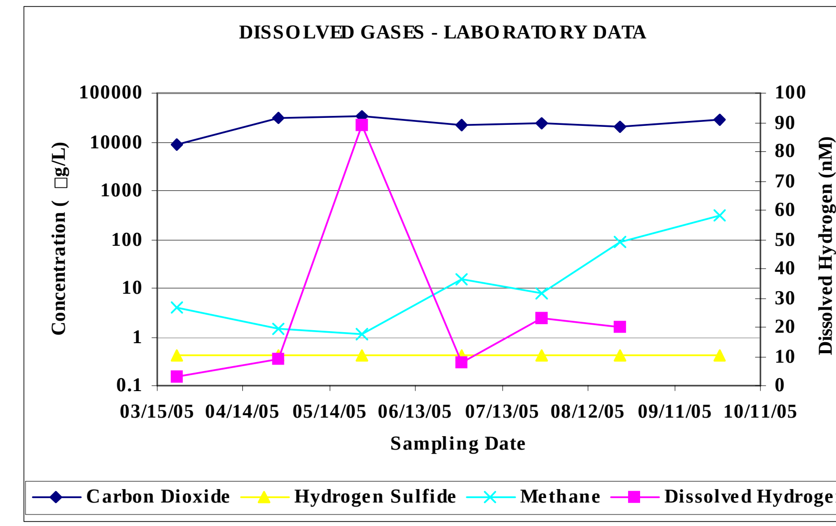


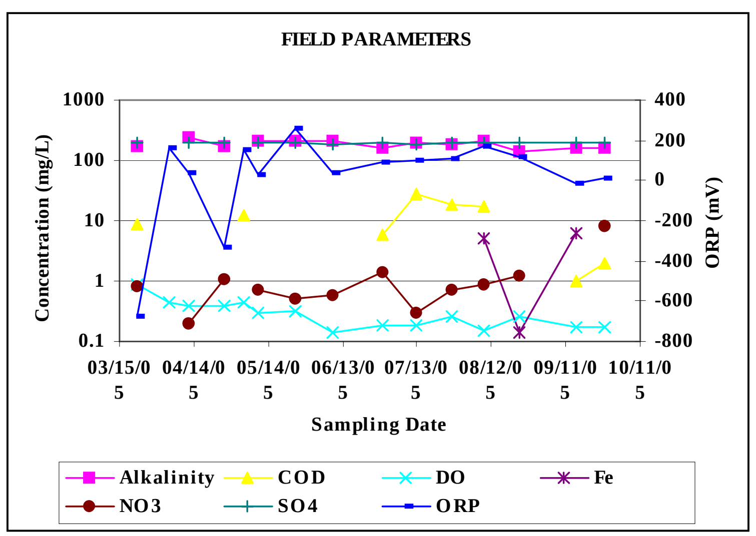


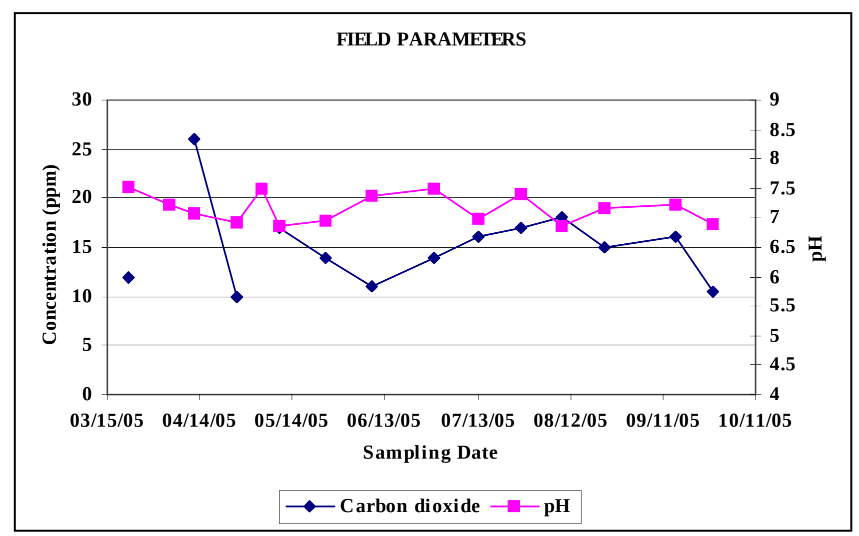


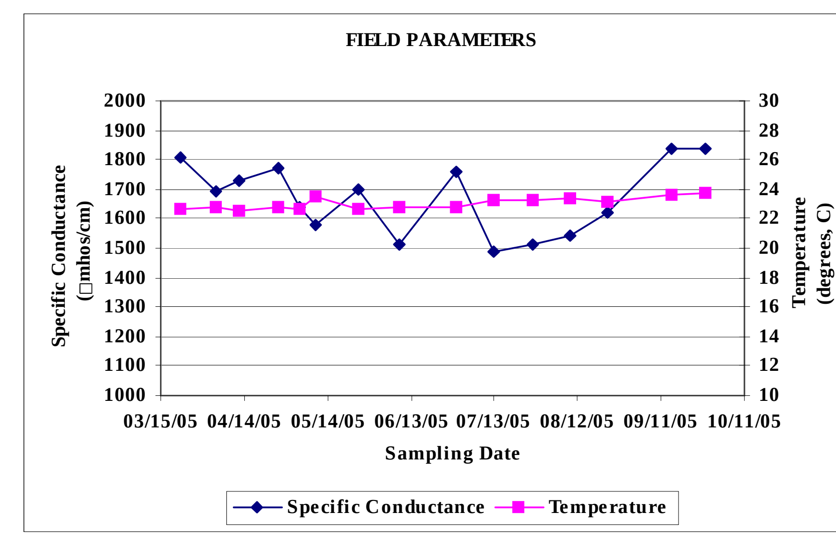












NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-10

SELECT MONITORING PARAMETER TRENDS
WELL MW-40-36 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

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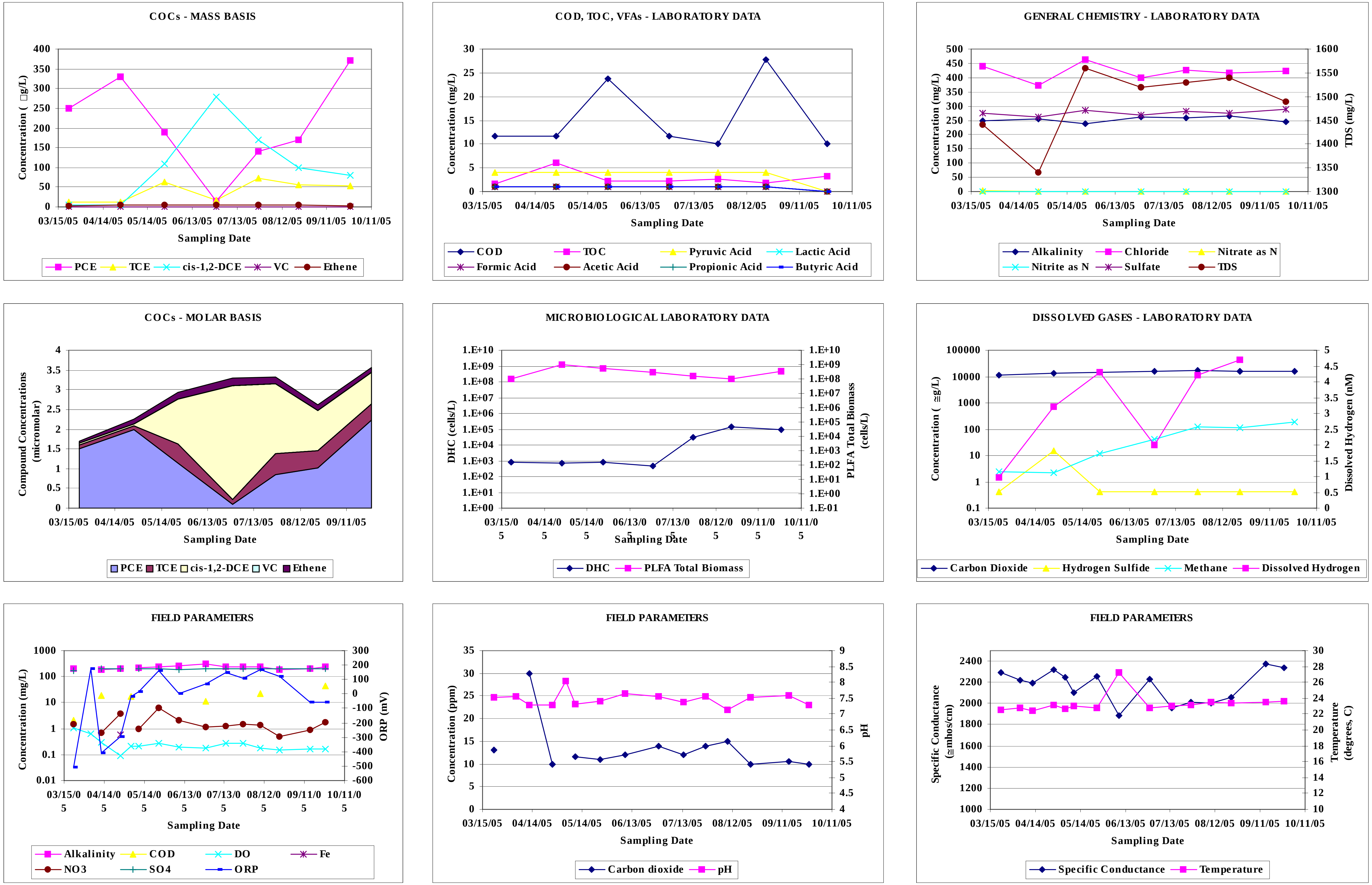
PLOT/UPDATE: NOV 15 2005 12:22:55



NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-11
SELECT MONITORING PARAMETER TRENDS
WELL MW-40-37 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169F11.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MT
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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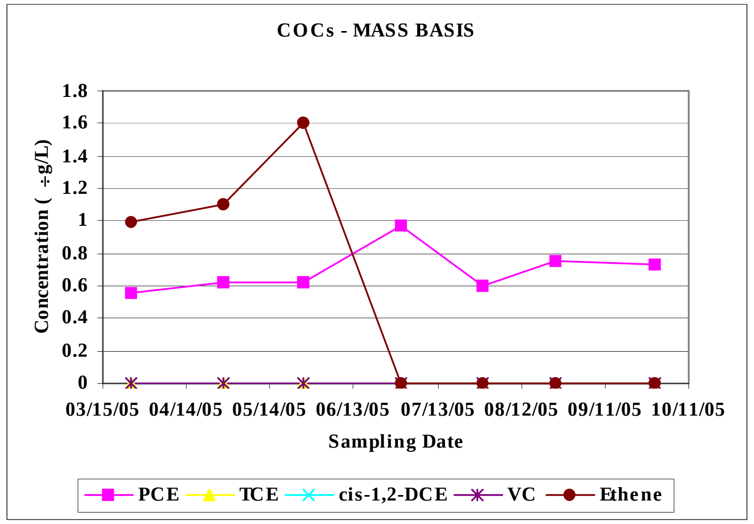

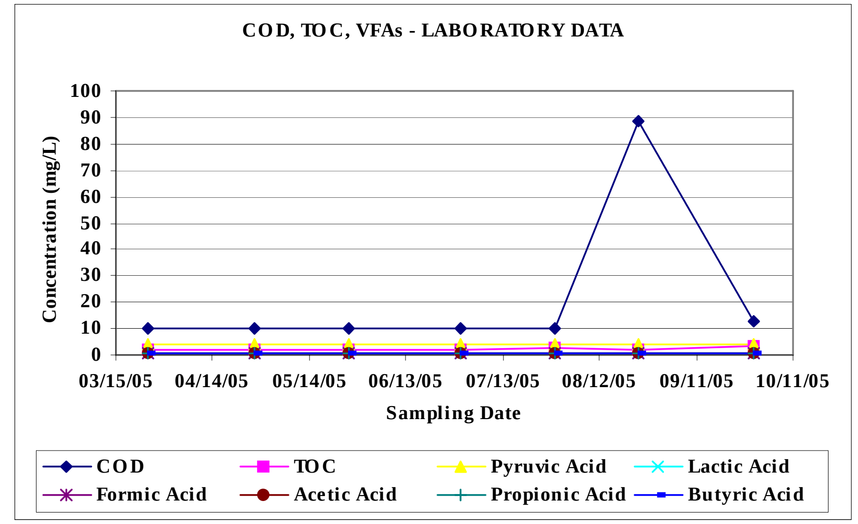

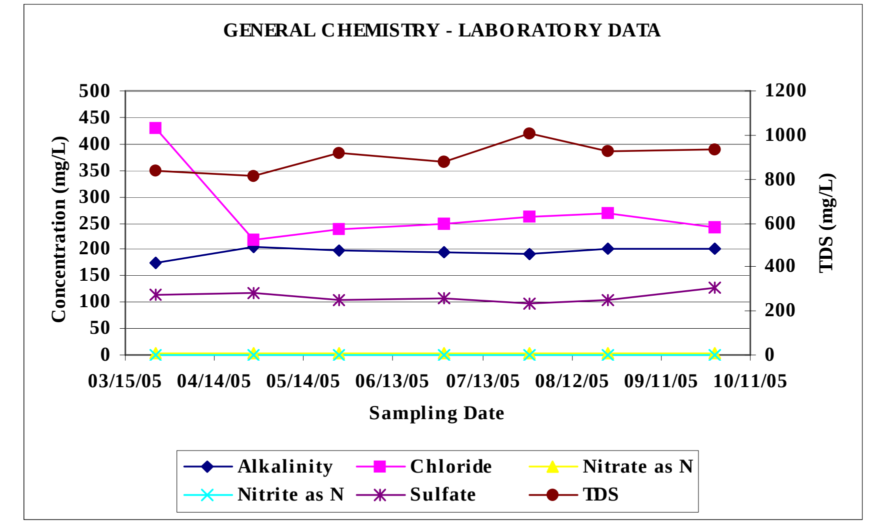

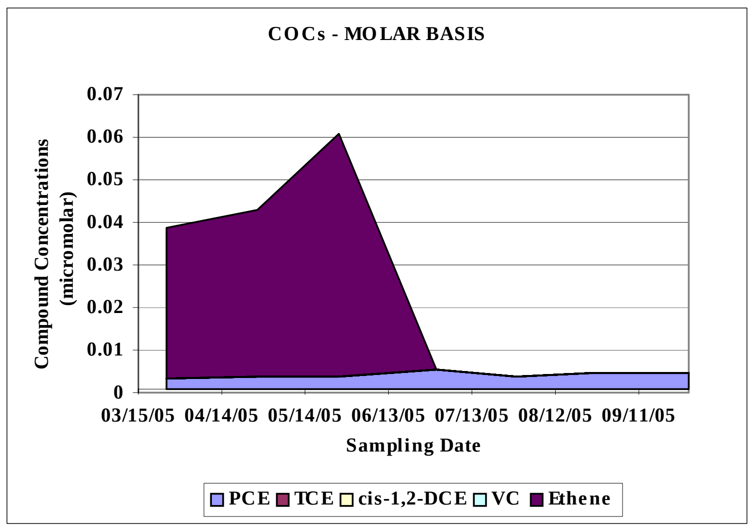

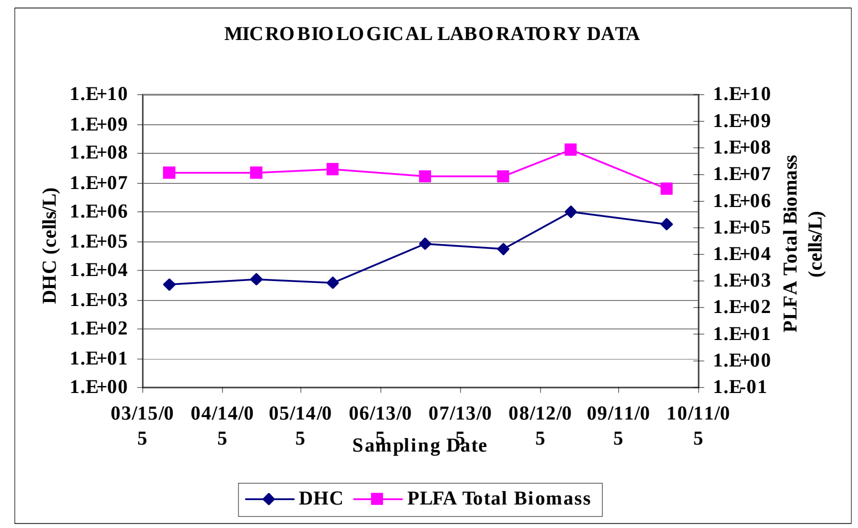

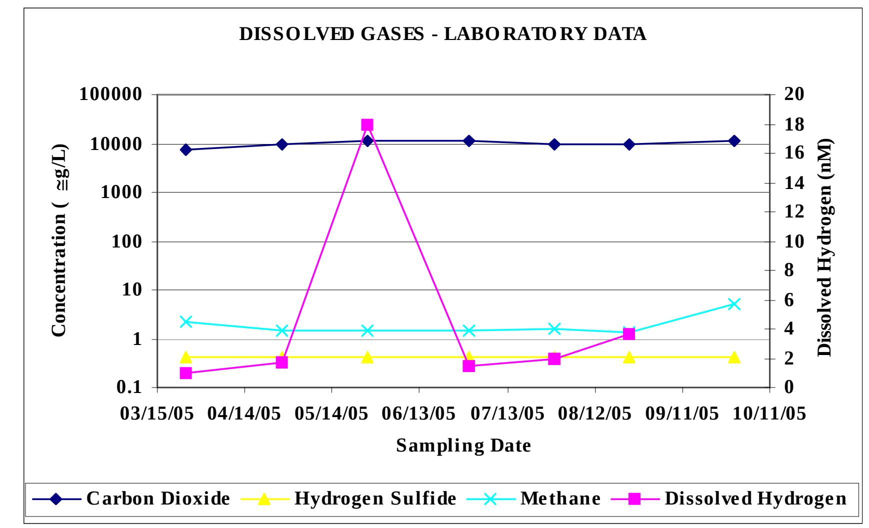

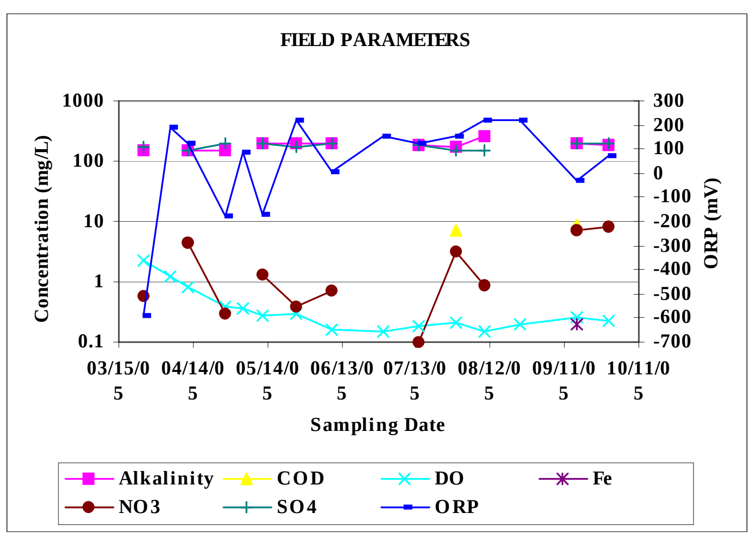

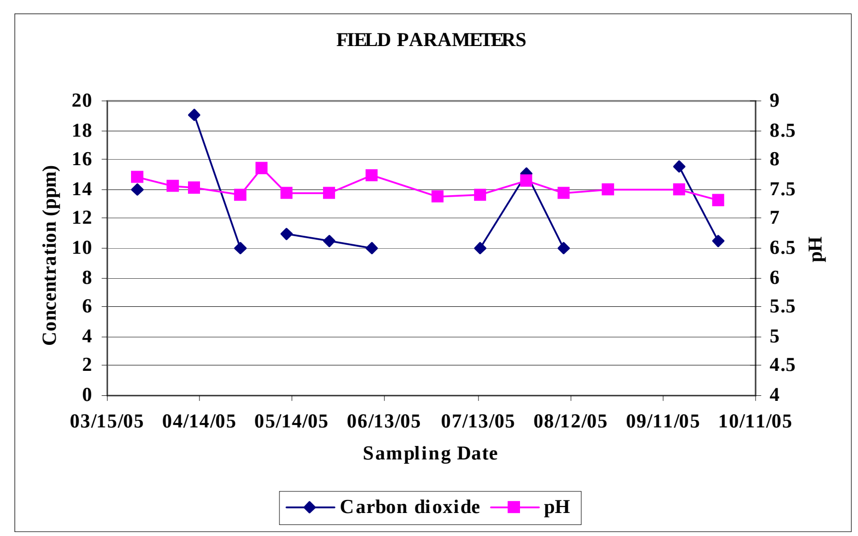

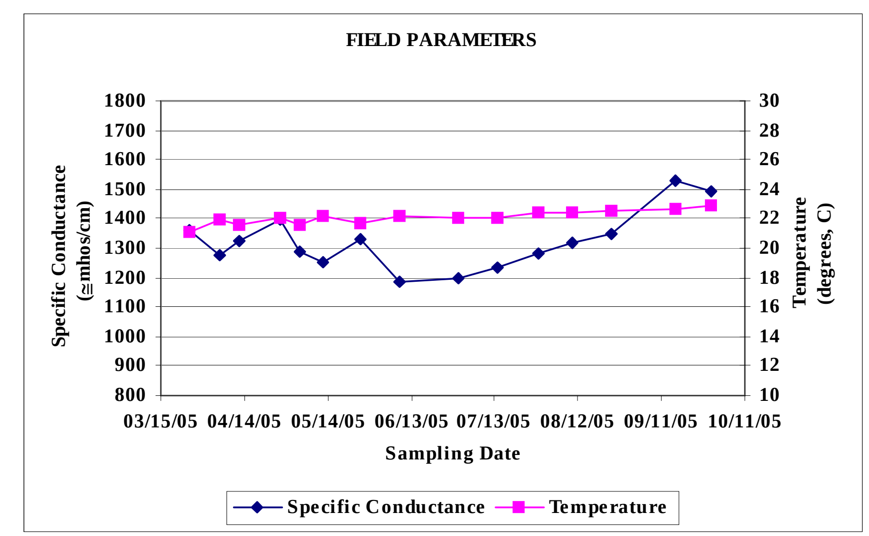

NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-12
SELECT MONITORING PARAMETER TRENDS
WELL MW-40-38 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169F12.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MT
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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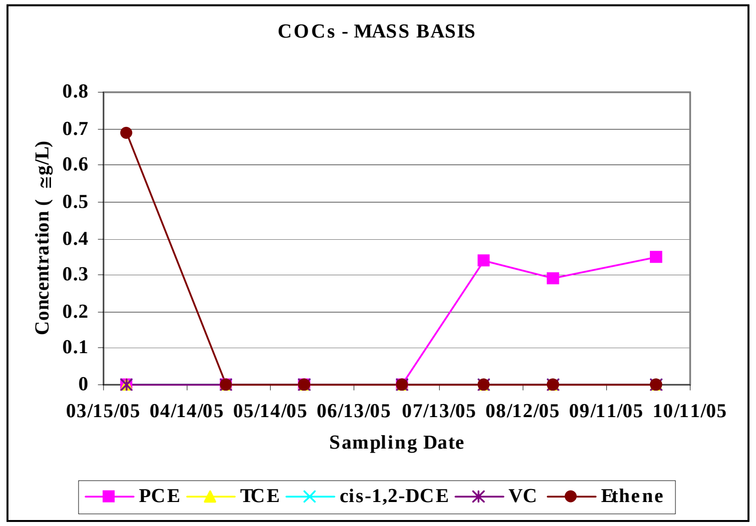
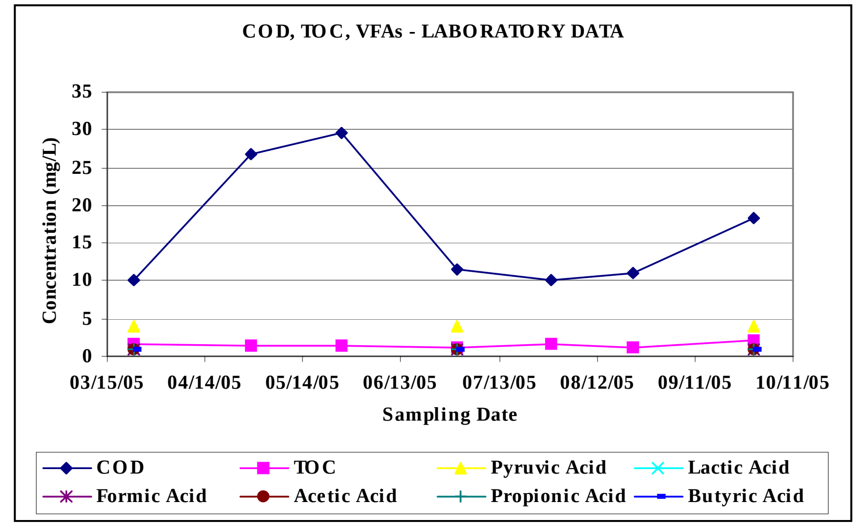
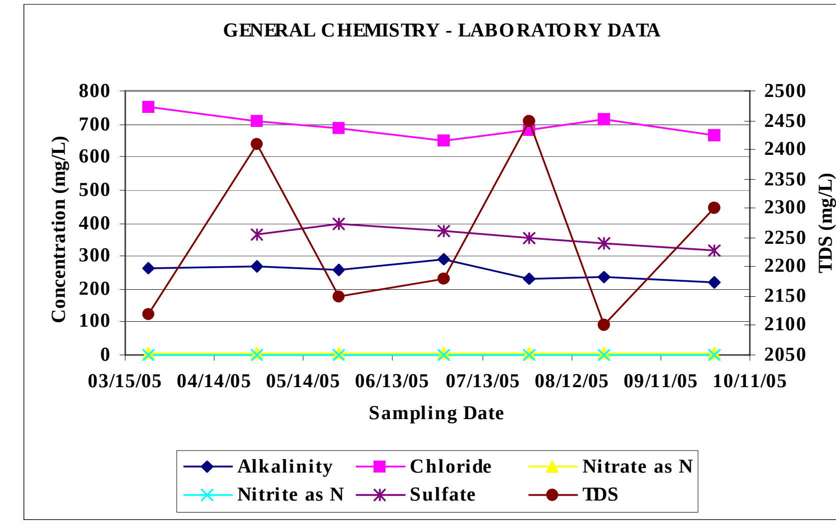
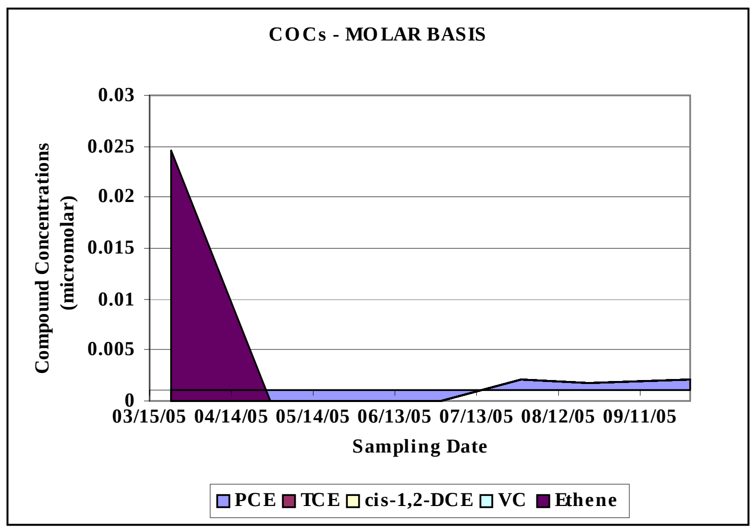
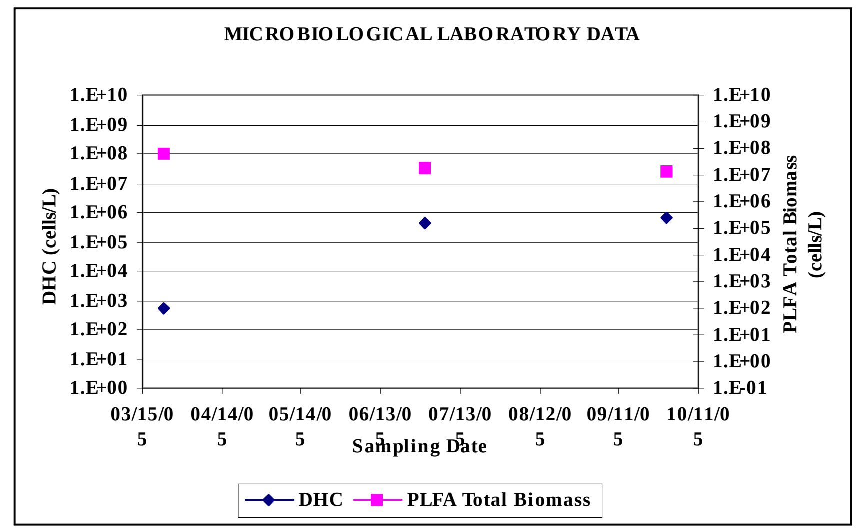
PLOT/UPDATE: NOV 15 2005 12:38:07

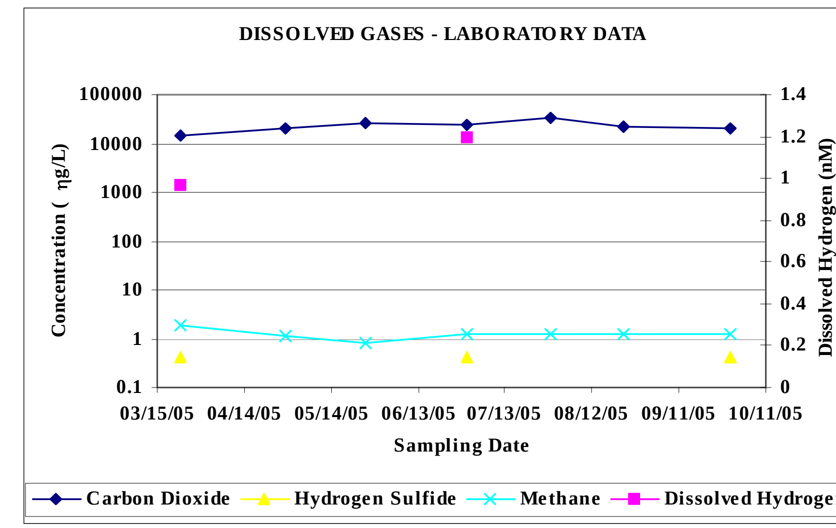


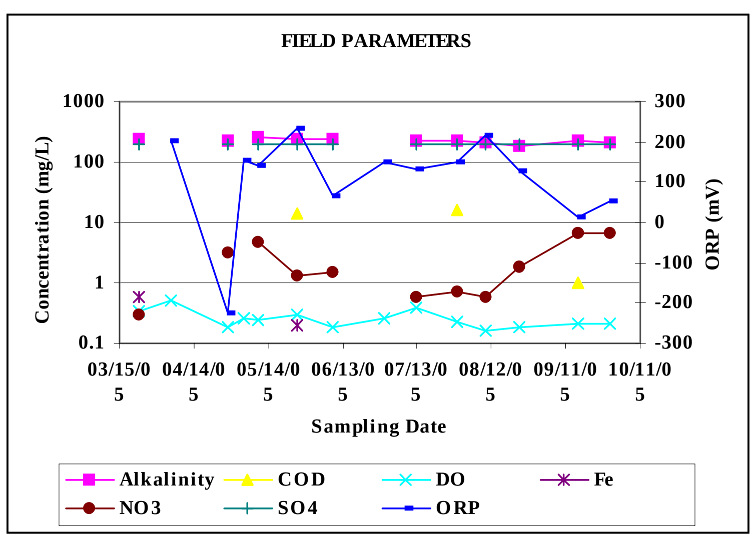


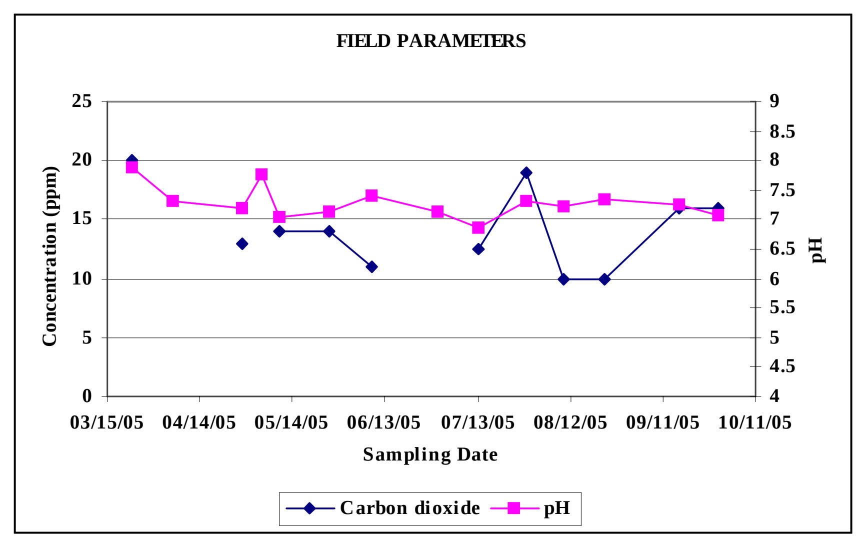


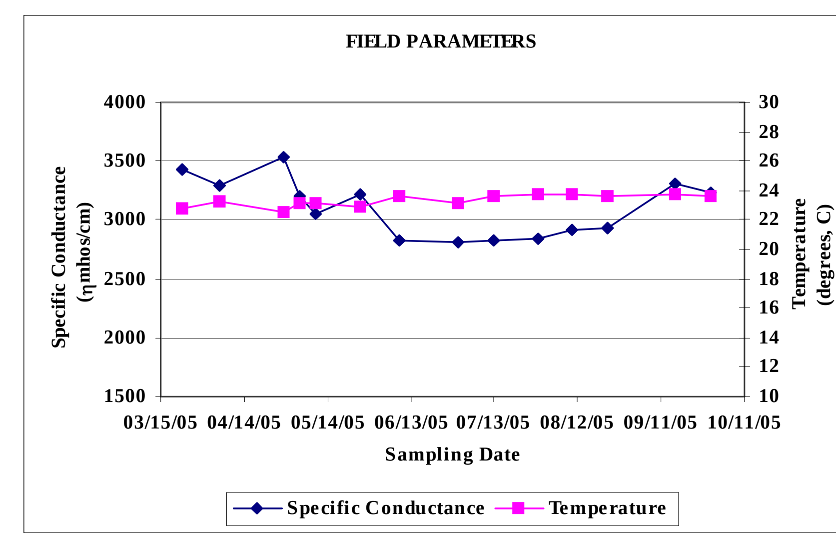












NOTE:

IT IS NOTED THAT ORP DATA COLLECTED FROM MARCH 22 THROUGH MARCH 25 AND FROM EARLY JULY THROUGH THE END OF AUGUST ARE BELIEVED TO BE UNRELIABLE DUE TO MALFUNCTIONING FIELD INSTRUMENT.

Figure F-13
SELECT MONITORING PARAMETER TRENDS
WELL MW-40-39 (MARCH THROUGH SEPTEMBER 2005)

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169F13.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MT
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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PLOT/UPDATE: NOV 15 2005 12:39:53

APPENDIX G

PHOSPHOLIPID FATTY ACIDS AND MICROBIAL COMMUNITY PROFILES

APPENDIX G

LIST OF FIGURES

APPENDIX H

SOIL VAPOR/GAS MONITORING RESULTS

APPENDIX H-1

TABLES H-1 THROUGH H-7

APPENDIX H-1

LIST OF TABLES

TABLE H-1

SOIL VAPOR/GAS CONCENTRATIONS IN MONITORING PROBES
APRIL 25, 2005

Well ID	Time	Methane (%)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Dioxide (%)	VOCs (ppmv)	Comments and Remarks	Casing Diameter (inches)	Screen Interval (bottom) (feet bgs)	Well Depth (feet bgs)
VW-40-01	14:15	77.9	0.2	0.0	14.0	NM		2	2.5 to 7.5	8
VW-40-02	14:30	70.6	0.2	0.0	24.0	NM		2	2.5 to 7.5	8
VW-40-03	12:45	60.5	0.6	11.0	21.0	NM		2	3.5 to 10	10.0
VW-40-04	13:40	0.0	17.3	0.0	0.0	NM		2	3.5 to 10	10.0
VW-40-05	13:45	0.0	16.4	0.0	0.0	NM		2	3.5 to 10	10.0
VW-40-06	13:50	0.0	13.9	0.0	0.0	NM		2	3.5 to 10	10.0
IW-1	14:10	58.9	0.6	0.0	13.0	NM		0.5	3.5 to 10	10.0
IW-2	9:55	81.0	19.4	0.0	0.0	NM		0.5	3.5 to 10	10.0
IW-3	9:10	5.0	15.1	0.0	1.0	NM		0.5	3.5 to 10	10.0
IW-4	8:55	0.0	20.8	0.0	2.0	NM		0.5	3.5 to 10	10.0
~~IW-5~~	There is no probe in this well, which is the former pilot test well MW-40-27.									
IW-6	8:30	1.0	20.5	0.0	0.0	NM		0.5	3.5 to 10	10.0
IW-7	8:15	14.7	0.9	0.0	7.0	NM		0.5	3.5 to 10	10.0
IW-8	10:05	22.0	12.9	0.0	0.0	NM		0.5	3.5 to 10	10.0
IW-9	9:15	1.0	20.4	0.0	0.0	NM		0.5	3.5 to 10	10.0
IW-10	9:40	1.0	14.8	0.0	0.0	NM		0.5	3.5 to 10	10.0
IW-11	10:00	2.0	0.6	0.0	13.0	NM		0.5	3.5 to 10	10.0
IW-12	9:00	16.0	1.5	0.0	8.0	NM		0.5	3.5 to 10	10.0
IW-13	9:30	13.0	20.2	0.0	0.0	NM		0.5	3.5 to 10	10.0
IW-14	9:20	2.0	16.1	0.0	1.0	NM		0.5	3.5 to 10	10.0
IW-15	9:25	9.0	25.0	0.0	-	NM	Unable to take accurate reading due to saturation of vapor well casing.	0.5	3.5 to 10	10.0
IW-16	8:45	0.0	14.3	0.0	0.0	NM		0.5	3.5 to 10	10.0
IW-17	9:35	1.0	9.3	0.0	1.0	NM		0.5	3.5 to 10	10.0
MW-40-30	13:25	0.0	20.9	0.0	0.0	NM		0.5	3.5 to 10	10.0
MW-40-31	9:20	1.0	20.8	0.0	0.0	NM		0.5	3.5 to 10	10.0
MW-40-32	13:30	0.0	20.9	0.0	0.0	NM		0.5	3.5 to 10	10.0
MW-40-33	14:05	0.0	5.9	0.0	0.0	NM		0.5	3.5 to 10	10.0
MW-40-34	14:00	0.0	3.6	0.0	0.0	NM		0.5	3.5 to 10	10.0
MW-40-35	9:10	52.0	2.3	0.0	0.0	NM		0.5	3.5 to 10	10.0
MW-40-36	9:15	2.0	16.9	0.0	0.0	NM		0.5	3.5 to 10	10.0
MW-40-37	13:15	0.0	19.2	0.0	0.0	NM		0.5	3.5 to 10	10.0
MW-40-38	13:20	0.0	20.8	0.0	0.0	NM		0.5	3.5 to 10	10.0
MW-40-39	13:30	0.0	6.5	0.0	0.0	NM		0.5	3.5 to 10	10.0

Notes:

9.0 Exceeding lower explosive limit (LEL) for methane, which is 5% in air.

bgs - below ground surface

NM - not measured

ppm - parts per million

ppmv - parts per million by volume

VOC - volatile organic compound

TABLE H-2

SOIL VAPOR/GAS CONCENTRATIONS IN MONITORING PROBES
MAY 2, 2005

Well ID	Time	Methane (%)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Dioxide (%)	VOCs (ppmv)	Comments and Remarks	Casing Diameter (inches)	Screen Interval (bottom) (feet bgs)	Well Depth (feet bgs)
VW-40-01	8:38	78.1	0.2	0	20.3	0.0		2	2.5 to 7.5	8
VW-40-02	8:43	65.8	1.5	0	20.3	0.0		2	2.5 to 7.5	8
VW-40-03	8:34	78.9	0.3	1	12.9	0.0		2	3.5 to 10	10.0
VW-40-04	10:40	0.2	18.5	0	0.2	0.9		2	3.5 to 10	10.0
VW-40-05	10:30	0.1	19.5	0	0.3	0.9		2	3.5 to 10	10.0
VW-40-06	11:08	0.2	11.2	0	1.7	0.5	CO - 115 ppm	2	3.5 to 10	10.0
IW-1	12:00	59.9	0.4	0	17.9	0.0		0.5	3.5 to 10	10.0
IW-2	11:53	8.8	0.2	22	35.3	0.0		0.5	3.5 to 10	10.0
IW-3	10:13	0.7	0.3	0	4.0	0.1		0.5	3.5 to 10	10.0
IW-4	10:18	0.1	8.9	0	3.4	1.6		0.5	3.5 to 10	10.0
IW-5	There is no probe in this well, which is the former pilot test well MW-40-27.									
IW-6	8:40	0.0	1.8	0	2.1	0.5		0.5	3.5 to 10	10.0
IW-7	8:45	26.7	0.2	0	5.2	0.0		0.5	3.5 to 10	10.0
IW-8	10:08	0.0	12.0	0	0.9	0.0		0.5	3.5 to 10	10.0
IW-9	Unable to monitor. Probe filled with water.							0.5	3.5 to 10	10.0
IW-10	10:25	0.0	17.4	0	0.8	1.2	CO - 53 ppm	0.5	3.5 to 10	10.0
IW-11	9:40	58.7	0.2	26	7.3	0.0	CO - 870 ppm	0.5	3.5 to 10	10.0
IW-12	9:35	40.6	0.2	0	2.3	0.0		0.5	3.5 to 10	10.0
IW-13	9:10	0.2	19.7	0	0.1	0.0		0.5	3.5 to 10	10.0
IW-14	9:52	0.0	15.6	0	1.7	1.6		0.5	3.5 to 10	10.0
IW-15	Unable to monitor. Probe filled with water.							0.5	3.5 to 10	10.0
IW-16	9:20	0.0	14.7	0	0.6	0.0		0.5	3.5 to 10	10.0
IW-17	9:45	0.1	9.3	0	1.0	1.9		0.5	3.5 to 10	10.0
MW-40-30	Unable to monitor. Probe filled with water.							0.5	3.5 to 10	10.0
MW-40-31	11:36	10.4	10.3	0	0.1	0.0	Water in probe.	0.5	3.5 to 10	10.0
MW-40-32	10:56	0.2	3.0	0	1.1	0.0		0.5	3.5 to 10	10.0
MW-40-33	9:25	0.0	4.9	0	0.2	0.0		0.5	3.5 to 10	10.0
MW-40-34	9:13	0.0	3.1	0	0.7	0.1	Water in probe.	0.5	3.5 to 10	10.0
MW-40-35	9:03	25.5	0.4	0	2.2	0.0		0.5	3.5 to 10	10.0
MW-40-36	9:55	0.1	3.8	0	1.6	0.5		0.5	3.5 to 10	10.0
MW-40-37	11:17	0.1	15.2	0	1.8	0.0	CO - 82 ppm	0.5	3.5 to 10	10.0
MW-40-38	10:55	0.1	20.0	0	0.0	0.0		0.5	3.5 to 10	10.0
MW-40-39	11:25	0.2	5.5	0	1.1	0.0		0.5	3.5 to 10	10.0

Notes:

10.4 Exceeding lower explosive limit (LEL) for methane, which is 5% in air.

bgs - below ground surface
CO - carbon monoxide
ppm - parts per million
ppmv - parts per million by volume
VOC - volatile organic compound

TABLE H-3

SOIL VAPOR/GAS CONCENTRATIONS IN MONITORING PROBES
JUNE 1, 2005

Well ID	Time	Methane (%)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Dioxide (%)	VOCs (ppmv)	Comments and Remarks	Casing Diameter (inches)	Screen Interval (bottom) (feet bgs)	Well Depth (feet bgs)
VW-40-01	14:02	74.3	0.5	0	21.7	NM	--	2	2.5 to 7.5	8
VW-40-02	13:55	71.4	0.3	0	24.5	NM	--	2	2.5 to 7.5	8
VW-40-03	13:36	0.5	18.2	0	0.3	NM	--	2	3.5 to 10	10.0
VW-40-04	11:55	0.1	19.7	0	0.0	NM	--	2	3.5 to 10	10.0
VW-40-05	11:50	0.2	20.0	0	0.0	NM	--	2	3.5 to 10	10.0
VW-40-06	11:40	0.1	19.0	0	0.2	NM	--	2	3.5 to 10	10.0
IW-1	13:41	0.2	19.2	12	0.4	NM	>999 ppm CO	0.5	3.5 to 10	10.0
IW-2	13:46	2.3	0.4	>200	48.3	NM	>999 ppm CO	0.5	3.5 to 10	10.0
IW-3	12:42	8.0	0.4	20	0.8	NM	>999 ppm CO	0.5	3.5 to 10	10.0
IW-4	12:37	0.1	5.8	0	2.3	NM	>999 ppm CO	0.5	3.5 to 10	10.0
IW-5	There is no probe in this well, which is the former pilot test well MW-40-27.									
IW-6	13:32	0.8	16.9	2	0.6	NM	--	0.5	3.5 to 10	10.0
IW-7	13:24	0.9	16.0	25	0.8	NM	--	0.5	3.5 to 10	10.0
IW-8	12:47	0.3	6.2	0	3.4	NM	--	0.5	3.5 to 10	10.0
IW-9	12:16	6.1	0.3	14	13.8	NM	--	0.5	3.5 to 10	10.0
IW-10	12:00	0.1	9.0	5	1.7	NM	>999 ppm CO	0.5	3.5 to 10	10.0
IW-11	10:10	52.9	0.2	12	5.5	NM	44 ppm CO	0.5	3.5 to 10	10.0
IW-12	10:16	2.5	0.2	107	4.1	NM	>999 ppm CO	0.5	3.5 to 10	10.0
IW-13	10:53	0.4	18.2	20	0.1	NM	>999 ppm CO	0.5	3.5 to 10	10.0
IW-14	13:13	2.9	9.9	0	1.7	NM	--	0.5	3.5 to 10	10.0
IW-15	11:16	0.3	0.7	66	57.7	NM	--	0.5	3.5 to 10	10.0
IW-16	10:51	0.1	6.6	0	0.2	NM	357 ppm CO	0.5	3.5 to 10	10.0
IW-17	11:03	0.3	5.4	0	1.1	NM	--	0.5	3.5 to 10	10.0
MW-40-30	12:54	Unable to monitor. Probe filled with water.						0.5	3.5 to 10	10.0
MW-40-31	12:59	0.4	8.2	0	3.0	NM	140 ppm CO	0.5	3.5 to 10	10.0
MW-40-32	12:10	0.4	0.4	140	0.8	NM	>999 ppm CO	0.5	3.5 to 10	10.0
MW-40-33	10:30	0.1	5.2	0	0.2	NM	--	0.5	3.5 to 10	10.0
MW-40-34	11:00	0.8	0.5	>200	1.8	NM	--	0.5	3.5 to 10	10.0
MW-40-35	13:19	2.1	11.7	>200	1.1	NM	>999 ppm CO	0.5	3.5 to 10	10.0
MW-40-36	13:06	2.3	9.6	0	2.2	NM	--	0.5	3.5 to 10	10.0
MW-40-37	11:22	0.1	19.5	0	0.5	NM	--	0.5	3.5 to 10	10.0
MW-40-38	12:23	0.1	8.6	0	0.8	NM	--	0.5	3.5 to 10	10.0
MW-40-39	11:10	0.1	4.1	0	2.0	NM	--	0.5	3.5 to 10	10.0

Notes:

6.1 Exceeding lower explosive limit (LEL) for methane, which is 5% in air.

bgs - below ground surface
CO - carbon monoxide
NM - not measures
ppm - parts per million
ppmv - parts per million by volume
VOC - volatile organic compound

TABLE H-4

SOIL VAPOR/GAS CONCENTRATIONS IN MONITORING PROBES
JUNE 28, 2005

Well ID	Time	Methane (%)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Dioxide (%)	VOCs (ppmv)	Comments and Remarks	Casing Diameter (inches)	Screen Interval (bottom) (feet bgs)	Well Depth (feet bgs)
VW-40-01	7:45	70.1	2.3	0	20.1	0.0	14 ppm CO	2	2.5 to 7.5	8
VW-40-02	7:49	73.7	0.5	0	24.8	0.0	13 ppm CO	2	2.5 to 7.5	8
VW-40-03	7:58	73.7	1.5	0	15.4	0.0	17 ppm CO	2	3.5 to 10	10.0
VW-40-04	9:19	0.1	17.5	0	0.5	0.9	--	2	3.5 to 10	10.0
VW-40-05	9:08	0.1	13.4	0	2.8	1.6	--	2	3.5 to 10	10.0
VW-40-06	8:53	0.2	19.0	0	0.1	0.0	--	2	3.5 to 10	10.0
IW-1	7:42	57.0	1.5	0	19.5	0.0	8 ppm CO	0.5	3.5 to 10	10.0
IW-2	9:50	0.8	16.9	8	2.3	0.0	170 ppm CO	0.5	3.5 to 10	10.0
IW-3	9:38	0.3	18.0	0	0.7	0.0	--	0.5	3.5 to 10	10.0
IW-4	9:44	0.4	18.0	0	1.0	0.1	--	0.5	3.5 to 10	10.0
IW-5	There is no probe in this well, which is the former pilot test well MW-40-27.									
IW-6	8:06	9.9	0.4	0	6.0	0.0	27 ppm CO	0.5	3.5 to 10	10.0
IW-7	8:36	37.6	0.8	6	1.8	0.0	>999 ppm CO	0.5	3.5 to 10	10.0
IW-8	9:01	0.2	9.4	0	5.7	3.4	329 ppm CO	0.5	3.5 to 10	10.0
IW-9	9:30	5.7	0.3	7	17.5	0.5	185 ppm CO	0.5	3.5 to 10	10.0
IW-10	9:22	0.2	12.1	0	2.8	0.5	--	0.5	3.5 to 10	10.0
IW-11	7:52	35.4	0.3	4	7.1	0.0	5 ppm CO	0.5	3.5 to 10	10.0
IW-12	8:09	26.8	0.4	172	13.2	0.0	>999 ppm CO	0.5	3.5 to 10	10.0
IW-13	8:30	0.1	19.4	0	0.1	4.9	--	0.5	3.5 to 10	10.0
IW-14	8:39	0.2	14.2	0	1.1	1.2	--	0.5	3.5 to 10	10.0
IW-15	8:47	16.1	0.7	7	23.1	0.0	427 ppm CO	0.5	3.5 to 10	10.0
IW-16	8:15	0.2	13.2	0	0.6	3.0	--	0.5	3.5 to 10	10.0
IW-17	8:26	0.1	19.2	0	0.0	3.4	--	0.5	3.5 to 10	10.0
MW-40-30	Unable to monitor. Probe filled with water.							0.5	3.5 to 10	10.0
MW-40-31	9:05	0.1	13.2	0	0.4	1.2	--	0.5	3.5 to 10	10.0
MW-40-32	9:25	0.4	1.4	0	0.3	0.1	--	0.5	3.5 to 10	10.0
MW-40-33	8:12	26.7	0.2	0	13.0	4.1	--	0.5	3.5 to 10	10.0
MW-40-34	8:19	0.1	0.9	0	1.0	4.0	--	0.5	3.5 to 10	10.0
MW-40-35	8:33	0.3	19.4	0	0.0	0.0	--	0.5	3.5 to 10	10.0
MW-40-36	8:45	0.2	0.8	0	3.1	0.9	--	0.5	3.5 to 10	10.0
MW-40-37	8:49	0.1	18.5	0	0.1	3.0	--	0.5	3.5 to 10	10.0
MW-40-38	8:47	0.6	17.6	0	1.9	0.1	--	0.5	3.5 to 10	10.0
MW-40-39	8:56	0.1	5.7	0	2.7	0.5	--	0.5	3.5 to 10	10.0

Notes:

16.1 Exceeding lower explosive limit (LEL) for methane, which is 5% in air.

bgs - below ground surface
CO - carbon monoxide
ppm - parts per million
ppmv - parts per million by volume
VOC - volatile organic compound

TABLE H-5

SOIL VAPOR/GAS CONCENTRATIONS IN MONITORING PROBES
JULY 27, 2005

Well ID	Time	Methane (%)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Dioxide (%)	VOCs (ppmv)	Comments and Remarks	Casing Diameter (inches)	Screen Interval (bottom) (feet bgs)	Well Depth (feet bgs)
VW-40-01	07:30	76.2	1.7	0	22.9	0.0	CO => 10 ppm	2	2.5 to 7.5	8
VW-40-02	07:37	71.9	0.6	0	26.1	0.0	CO => 18 ppm	2	2.5 to 7.5	8
VW-40-03	07:41	75.2	0.5	0	18.8	0.0	CO => 22 ppm	2	3.5 to 10	10.0
VW-40-04	09:08	0.1	18.1	0	0.5	0.0	----	2	3.5 to 10	10.0
VW-40-05	09:04	0.1	18.5	0	0.0	0.0	----	2	3.5 to 10	10.0
VW-40-06	08:55	0.1	18.8	0	0.1	0.0	----	2	3.5 to 10	10.0
IW-1	07:25	54.1	0.7	0	20.1	0.0	CO => 2 ppm	0.5	3.5 to 10	10.0
IW-2	09:49	23.5	0.4	3	21.7	0.0	CO => 6 ppm	0.5	3.5 to 10	10.0
IW-3	09:44	13.0	0.6	0	4.9	0.0	CO => 1 ppm	0.5	3.5 to 10	10.0
IW-4	09:55	0.1	5.9	0	2.4	0.0	----	0.5	3.5 to 10	10.0
IW-5	There is no probe in this well, which is the former pilot test well MW-40-27.									
IW-6	07:46	17.9	0.3	0	6.7	0.5	CO => 8 ppm	0.5	3.5 to 10	10.0
IW-7	08:34	40.9	0.4	1	4.0	0.0	CO => 4 ppm	0.5	3.5 to 10	10.0
IW-8	08:48	0.3	1.8	0	8.7	0.5	----	0.5	3.5 to 10	10.0
IW-9	09:19	0.1	0.4	0	0.1	0.0	----	0.5	3.5 to 10	10.0
IW-10	09:40	0.2	0.5	0	0.3	0.0	----	0.5	3.5 to 10	10.0
IW-11	07:51	26.6	0.2	2	7.9	0.0	CO => 6 ppm	0.5	3.5 to 10	10.0
IW-12	08:01	49.6	0.4	2	6.7	0.1	CO => 10 ppm	0.5	3.5 to 10	10.0
IW-13	08:26	0.1	18.5	0	0.0	0.0	----	0.5	3.5 to 10	10.0
IW-14	08:38	1.5	0.6	0	4.0	0.0	----	0.5	3.5 to 10	10.0
IW-15	10:10	26.8	0.7	1	21.5	0.0	CO => 13 ppm	0.5	3.5 to 10	10.0
IW-16	08:05	0.2	17.0	0	0.2	0.1	----	0.5	3.5 to 10	10.0
IW-17	08:18	0.1	15.8	0	0.3	0.1	----	0.5	3.5 to 10	10.0
MW-40-30	Unable to monitor. Probe filled with water.							0.5	3.5 to 10	10.0
MW-40-31	09:01	0.1	2.4	0	0.6	0.9	----	0.5	3.5 to 10	10.0
MW-40-32	09:35	0.1	0.6	0	0.3	0.0	----	0.5	3.5 to 10	10.0
MW-40-33	07:56	0.2	5.2	0	0.3	6.0	----	0.5	3.5 to 10	10.0
MW-40-34	08:15	0.1	5.8	0	1.3	0.1	----	0.5	3.5 to 10	10.0
MW-40-35	08:31	32.5	1.1	0	2.1	0.1	----	0.5	3.5 to 10	10.0
MW-40-36	08:42	0.1	0.5	0	4.5	0.5	----	0.5	3.5 to 10	10.0
MW-40-37	10:08	0.1	18.6	0	0.6	0.0	Broken Probe	0.5	3.5 to 10	10.0
MW-40-38	09:59	0.2	5.7	0	1.0	0.0	----	0.5	3.5 to 10	10.0
MW-40-39	10:05	0.0	6.6	0	3.1	0.0	----	0.5	3.5 to 10	10.0

Notes:

13.0 Exceeding lower explosive limit (LEL) for methane, which is 5% in air.

bgs - below ground surface
CO - carbon monoxide
ppm - parts per million
ppmv - parts per million by volume
VOC - volatile organic compound

TABLE H-6

SOIL VAPOR/GAS CONCENTRATIONS IN MONITORING PROBES
AUGUST 23, 2005

Well ID	Time	Methane (%)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Dioxide (%)	VOCs (ppmv)	Comments and Remarks	Casing Diameter (inches)	Screen Interval (bottom) (feet bgs)	Well Depth (feet bgs)
VW-40-01	13:38	72.9	0.5	0	23.9	0.0	Lots of crickets	2	2.5 to 7.5	8
VW-40-02	13:39	Unable to monitor. Vehicle parked on top of the well.						2	2.5 to 7.5	8
VW-40-03	13:44	71.8	0.5	0	21.8	0.0	-------	2	3.5 to 10	10.0
VW-40-04	14:05	0.2	19.3	0	0.2	0.9	-------	2	3.5 to 10	10.0
VW-40-05	13:58	0.1	18.2	0	2.6	0.9	-------	2	3.5 to 10	10.0
VW-40-06	13:50	2.9	13.1	0	2.8	0.0	-------	2	3.5 to 10	10.0
IW-1	09:50	37.2	3.7	0	19.2	0.0	CO: 12 ppm	0.5	3.5 to 10	10.0
IW-2	09:58	24.3	0.3	52	61.2	0.2	CO: >999 ppm	0.5	3.5 to 10	10.0
IW-3	09:53	18.2	1.0	17	5.0	0.3	CO: >999 ppm	0.5	3.5 to 10	10.0
IW-4	09:55	18.0	0.3	67	6.9	0.5	CO: 113 ppm	0.5	3.5 to 10	10.0
IW-5	There is no probe in this well, which is the former pilot test well MW-40-27.									
IW-6	10:10	24.9	0.2	0	8.0	0.0	CO: 24 ppm	0.5	3.5 to 10	10.0
IW-7	10:20	15.2	4.8	2	8.1	0.0	CO: >999 ppm	0.5	3.5 to 10	10.0
IW-8	10:27	9.1	0.5	130	26.8	0.5	CO: >999 ppm	0.5	3.5 to 10	10.0
IW-9	10:37	39.6	0.3	12	39.5	0.0	CO: >999 ppm	0.5	3.5 to 10	10.0
IW-10	10:44	31.6	0.4	>200	19.2	0.1	-------	0.5	3.5 to 10	10.0
IW-11	11:25	32.1	0.3	38	7.4	0.5	CO: >999 ppm	0.5	3.5 to 10	10.0
IW-12	11:37	44.3	0.3	>200	4.4	0.0	CO: >999 ppm	0.5	3.5 to 10	10.0
IW-13	11:44	2.9	15.4	94	1.9	2.2	CO: >999 ppm	0.5	3.5 to 10	10.0
IW-14	11:52	18.1	0.4	>200	19.3	0.0	-------	0.5	3.5 to 10	10.0
IW-15	11:58	46.9	0.4	14	45.1	0.0	-------	0.5	3.5 to 10	10.0
IW-16	12:10	0.2	4.6	141	0.2	1.5	-------	0.5	3.5 to 10	10.0
IW-17	12:05	0.5	2.5	0	3.6	1.4	-------	0.5	3.5 to 10	10.0
MW-40-30	Unable to monitor. Probe filled with water.							0.5	3.5 to 10	10.0
MW-40-31	Unable to monitor. Probe filled with water.							0.5	3.5 to 10	10.0
MW-40-32	13:15	83.6	0.5	0	13.6	0.0	-------	0.5	3.5 to 10	10.0
MW-40-33	12:30	0.2	8.7	0	0.2	1.1	-------	0.5	3.5 to 10	10.0
MW-40-34	12:37	2.4	0.4	0	1.4	0.5	-------	0.5	3.5 to 10	10.0
MW-40-35	12:43	39.9	0.4	0	2.9	0.0	-------	0.5	3.5 to 10	10.0
MW-40-36	12:49	22.1	0.4	0	5.9	0.0	-------	0.5	3.5 to 10	10.0
MW-40-37	12:54	2.3	12.9	0	2.2	0.2	-------	0.5	3.5 to 10	10.0
MW-40-38	13:05	0.3	5.7	0	1.5	0.8	-------	0.5	3.5 to 10	10.0
MW-40-39	13:00	0.1	8.4	0	3.3	0.9	-------	0.5	3.5 to 10	10.0

Notes:

22.1 Exceeding lower explosive limit (LEL) for methane, which is 5% in air.

bgs - below ground suface

CO - carbon monoxide

ppm - parts per million

ppmv - parts per million by volume

VOC - volatile organic compound

TABLE H-7

SOIL VAPOR/GAS CONCENTRATIONS IN MONITORING PROBES
SEPTEMBER 27, 2005

Well ID	Time	Methane (%)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Dioxide (%)	VOCs (ppmv)	Comments and Remarks	Casing Diameter (inches)	Screen Interval (bottom) (feet bgs)	Well Depth (feet bgs)
VW-40-01	09:01	74.6	0.7	0	14.0	0.0	-----	2	2.5 to 7.5	8
VW-40-02	09:06	70.1	0.3	0	15.5	0.0	-----	2	2.5 to 7.5	8
VW-40-03	08:55	74.0	0.3	0	13.1	0.0	-----	2	3.5 to 10	10.0
VW-40-04	07:57	0.0	17.0	0	0.2	0.0	-----	2	3.5 to 10	10.0
VW-40-05	08:01	0.0	17.2	0	0.2	0.0	-----	2	3.5 to 10	10.0
VW-40-06	08:07	61.8	3.8	0	4.9	0.0	water in vault	2	3.5 to 10	10.0
IW-1	07:06	59.2	0.6	4	15.5	0.0	CO 19 ppm	0.5	3.5 to 10	10.0
IW-2	07:12	27.6	1.5	78	35.0	0.0	CO >999 ppm	0.5	3.5 to 10	10.0
IW-3	07:19	33.9	2.0	0	3.7	0.0	-----	0.5	3.5 to 10	10.0
IW-4	07:24	24.7	4.0	5	4.0	0.0	CO 386 ppm	0.5	3.5 to 10	10.0
IW-5	There is no probe in this well, which is the former pilot test well MW-40-27.									
IW-6	08:50	63.2	0.3	0	12.2	0.0	-----	0.5	3.5 to 10	10.0
IW-7	08:42	84.8	0.7	6	3.2	0.0	CO 138 ppm	0.5	3.5 to 10	10.0
IW-8	07:47	45.6	0.2	4	26.7	0.0	CO >999 ppm	0.5	3.5 to 10	10.0
IW-9	07:33	61.8	0.3	7	17.7	0.0	CO 165 ppm	0.5	3.5 to 10	10.0
IW-10	07:40	74.7	0.2	21	9.2	0.0	-----	0.5	3.5 to 10	10.0
IW-11	09:13	78.5	0.3	12	9.2	0.0	-----	0.5	3.5 to 10	10.0
IW-12	09:15	86.0	0.2	20	6.0	0.0	-----	0.5	3.5 to 10	10.0
IW-13	08:33	4.4	17.1	0	0.6	0.0	-----	0.5	3.5 to 10	10.0
IW-14	08:29	92.8	0.2	0	3.7	0.0	-----	0.5	3.5 to 10	10.0
IW-15	08:11	55.2	0.4	15	23.2	0.1	-----	0.5	3.5 to 10	10.0
IW-16	09:25	8.6	0.6	175	1.4	0.0	CO >999 ppm	0.5	3.5 to 10	10.0
IW-17	09:34	76.7	0.3	0	1.4	0.0	-----	0.5	3.5 to 10	10.0
MW-40-30	Unable to monitor. Probe filled with water.							0.5	3.5 to 10	10.0
MW-40-31	07:52	0.0	2.9	0	0.3	0.0	-----	0.5	3.5 to 10	10.0
MW-40-32	07:37	89.1	0.2	0	8.8	0.0	-----	0.5	3.5 to 10	10.0
MW-40-33	09:21	0.0	6.8	0	0.0	0.0	-----	0.5	3.5 to 10	10.0
MW-40-34	09:29	40.5	0.3	0	1.0	0.0	-----	0.5	3.5 to 10	10.0
MW-40-35	08:39	45.2	0.7	0	21.0	0.0	-----	0.5	3.5 to 10	10.0
MW-40-36	08:25	81.5	0.4	0	3.3	0.0	-----	0.5	3.5 to 10	10.0
MW-40-37	08:17	24.2	11.8	0	2.5	0.0	-----	0.5	3.5 to 10	10.0
MW-40-38	07:29	0.0	6.5	0	0.7	0.1	-----	0.5	3.5 to 10	10.0
MW-40-39	08:21	0.0	8.1	0	1.9	0.0	-----	0.5	3.5 to 10	10.0

Notes:

8.6 Exceeding lower explosive limit (LEL) for methane, which is 5% in air.

bgs - below ground surface

CO - carbon monoxide

ppm - parts per million

ppmv - parts per million by volume

VOC - volatile organic compound

APPENDIX H-2

FIGURES H-1 THROUGH H-7

APPENDIX H-2

LIST OF FIGURES

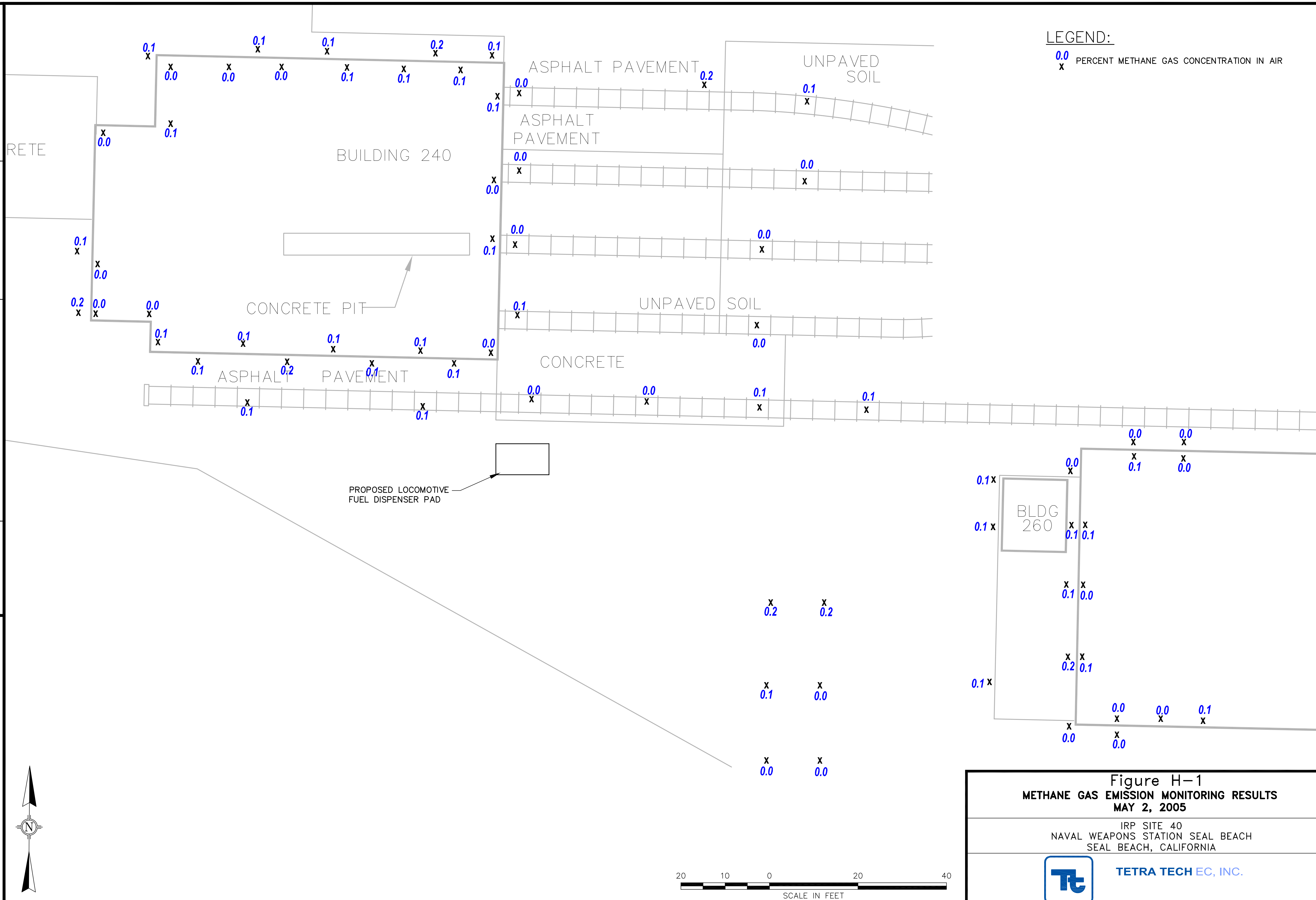

Figure H-1
METHANE GAS EMISSION MONITORING RESULTS
MAY 2, 2005

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169H1.DWG
DCN: FWSD-RAC-06-0169 | CTO: #0090
APPROVED BY: HH
CHECKED BY: MP | REV: REVISION 0
DRAWN BY: MD | DATE: 11/30/05

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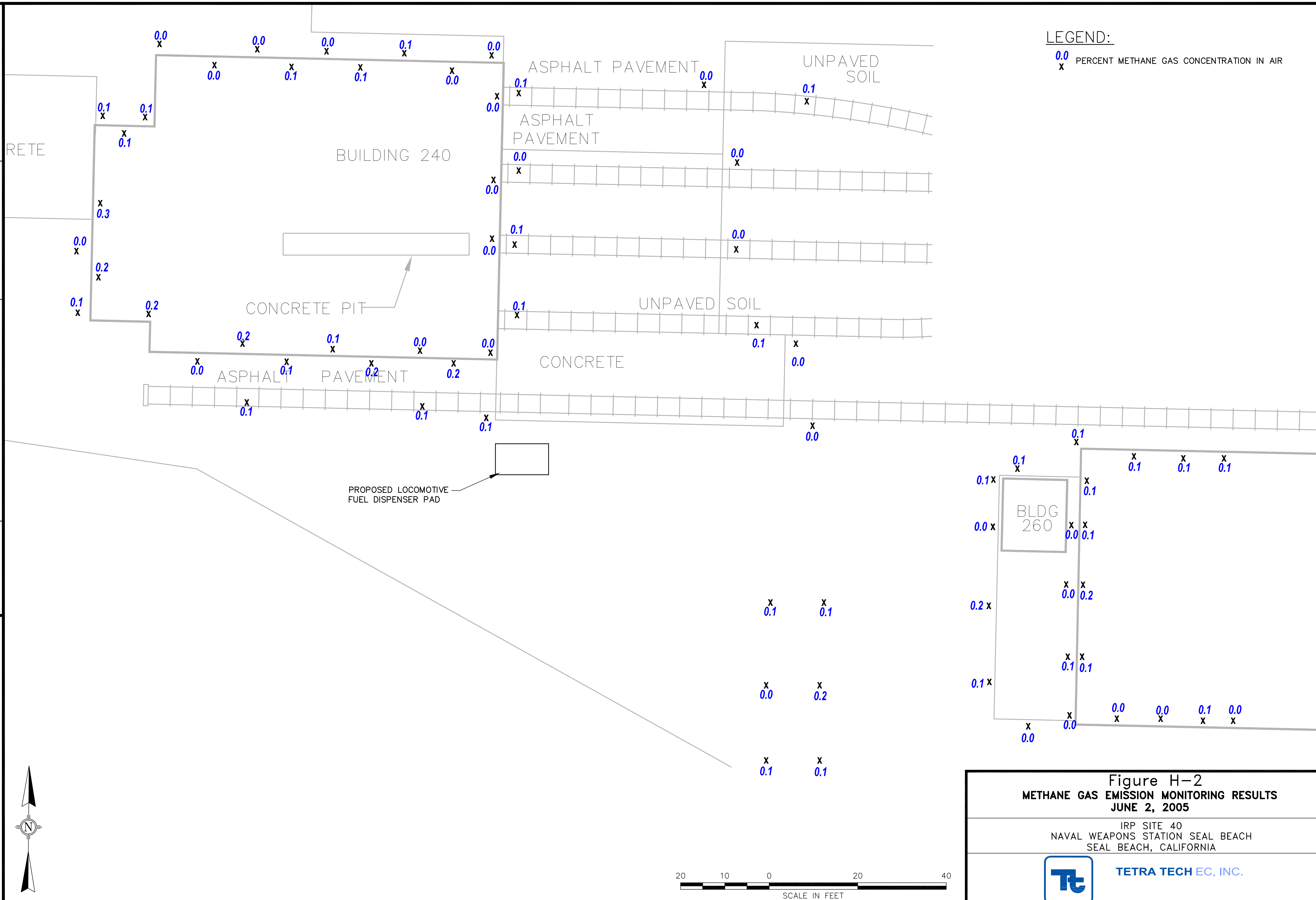

Figure H-2

METHANE GAS EMISSION MONITORING RESULTS
JUNE 2, 2005

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169H2.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MP
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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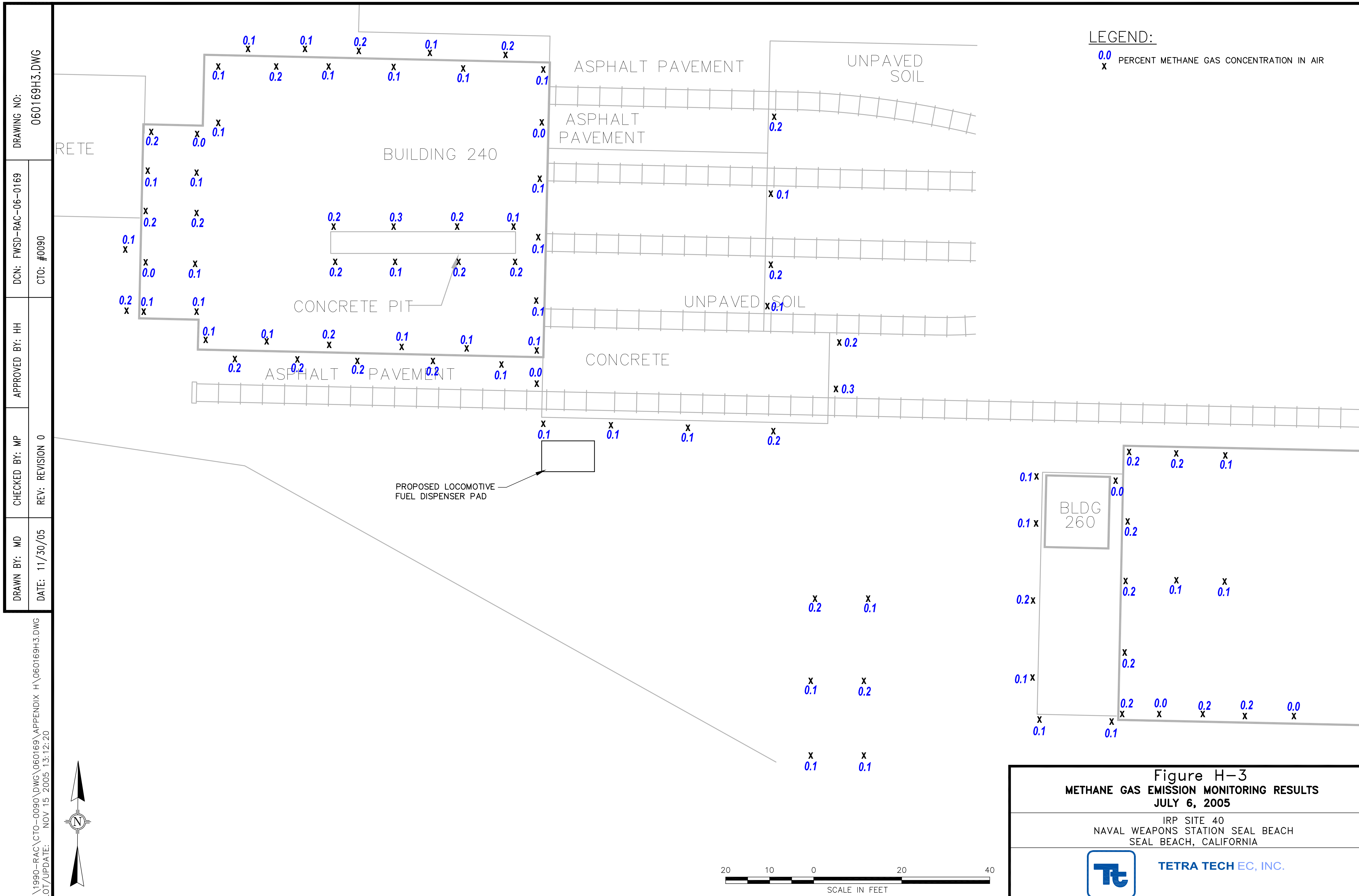

LEGEND:
0.0 x PERCENT METHANE GAS CONCENTRATION IN AIR
BUILDING 240
CONCRETE PIT
ASPHALT PAVEMENT
ASPHALT PAVEMENT
ASPHALT PAVEMENT
UNPAVED SOIL
UNPAVED SOIL
CONCRETE
RETE
PROPOSED LOCOMOTIVE FUEL DISPENSER PAD
BLDG 260
N
20 10 0 20 40
SCALE IN FEET
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DCN: FWSD-RAC-06-0169
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CHECKED BY: MP
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DATE: 11/30/05
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Figure H-3
METHANE GAS EMISSION MONITORING RESULTS
JULY 6, 2005
IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA
TETRA TECH EC, INC.

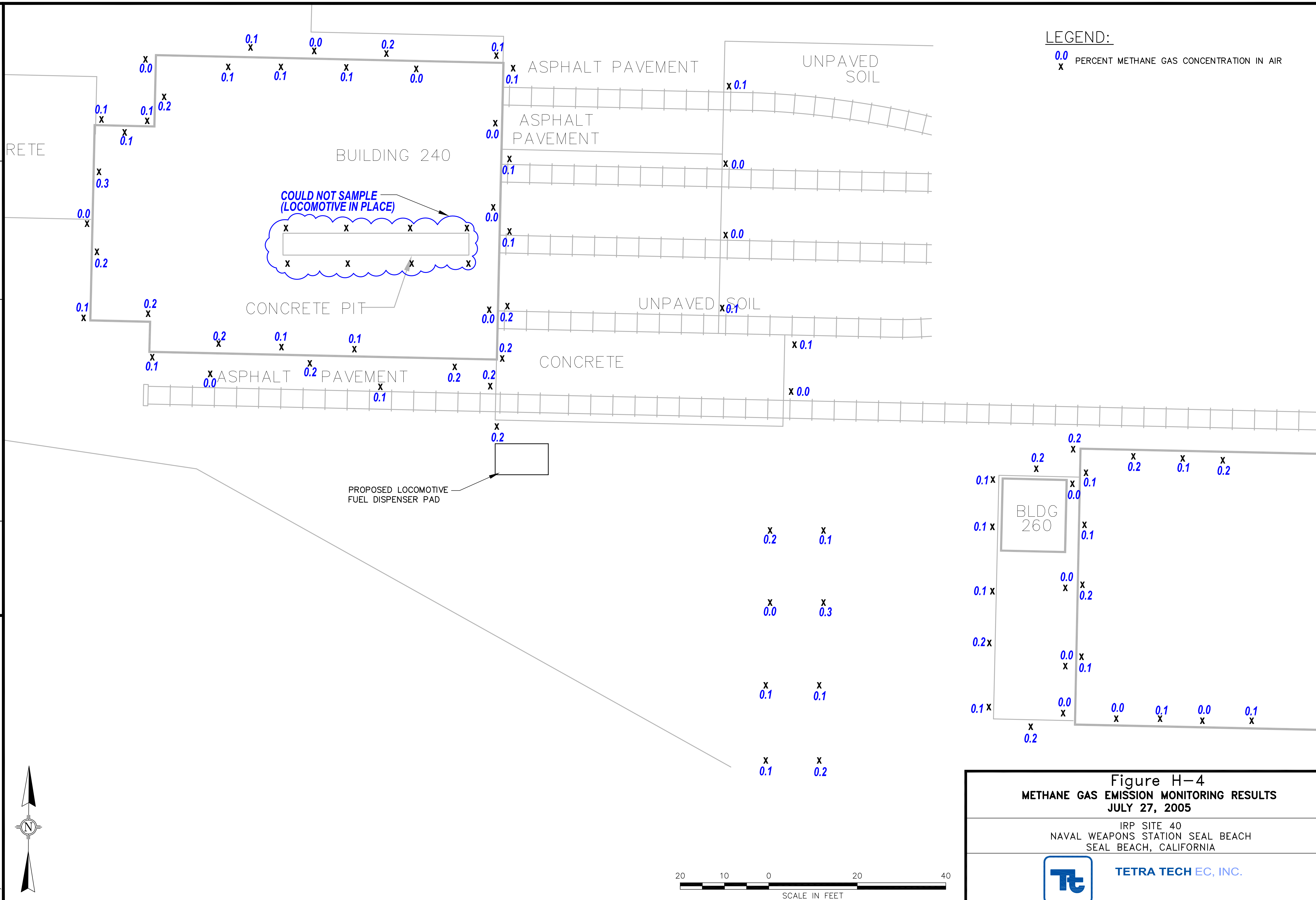

Figure H-4

METHANE GAS EMISSION MONITORING RESULTS
JULY 27, 2005

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169H4.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MP
REV: REVISION 0
DRAWN BY: MD
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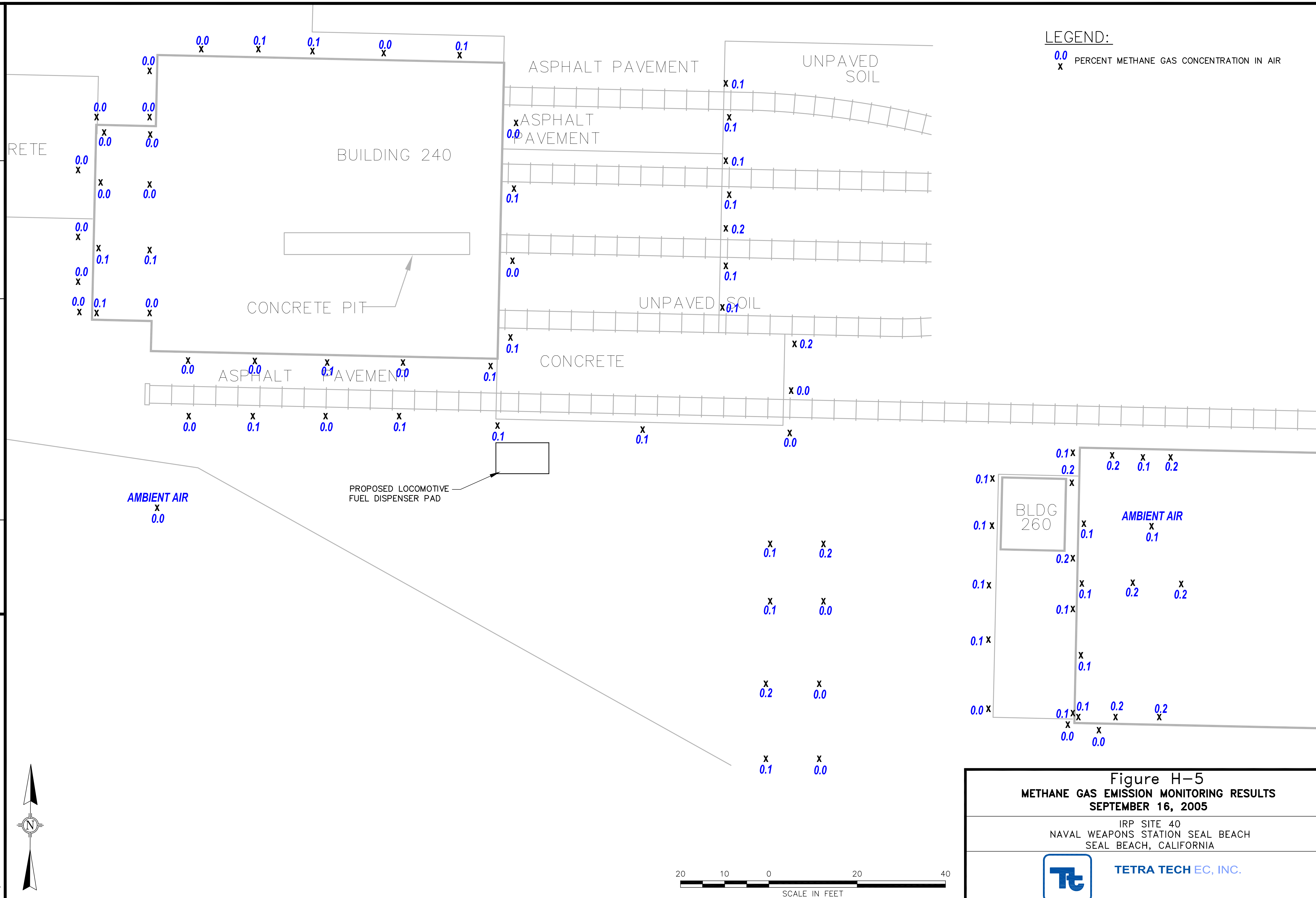

Figure H-5
METHANE GAS EMISSION MONITORING RESULTS
SEPTEMBER 16, 2005

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169H5.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MP
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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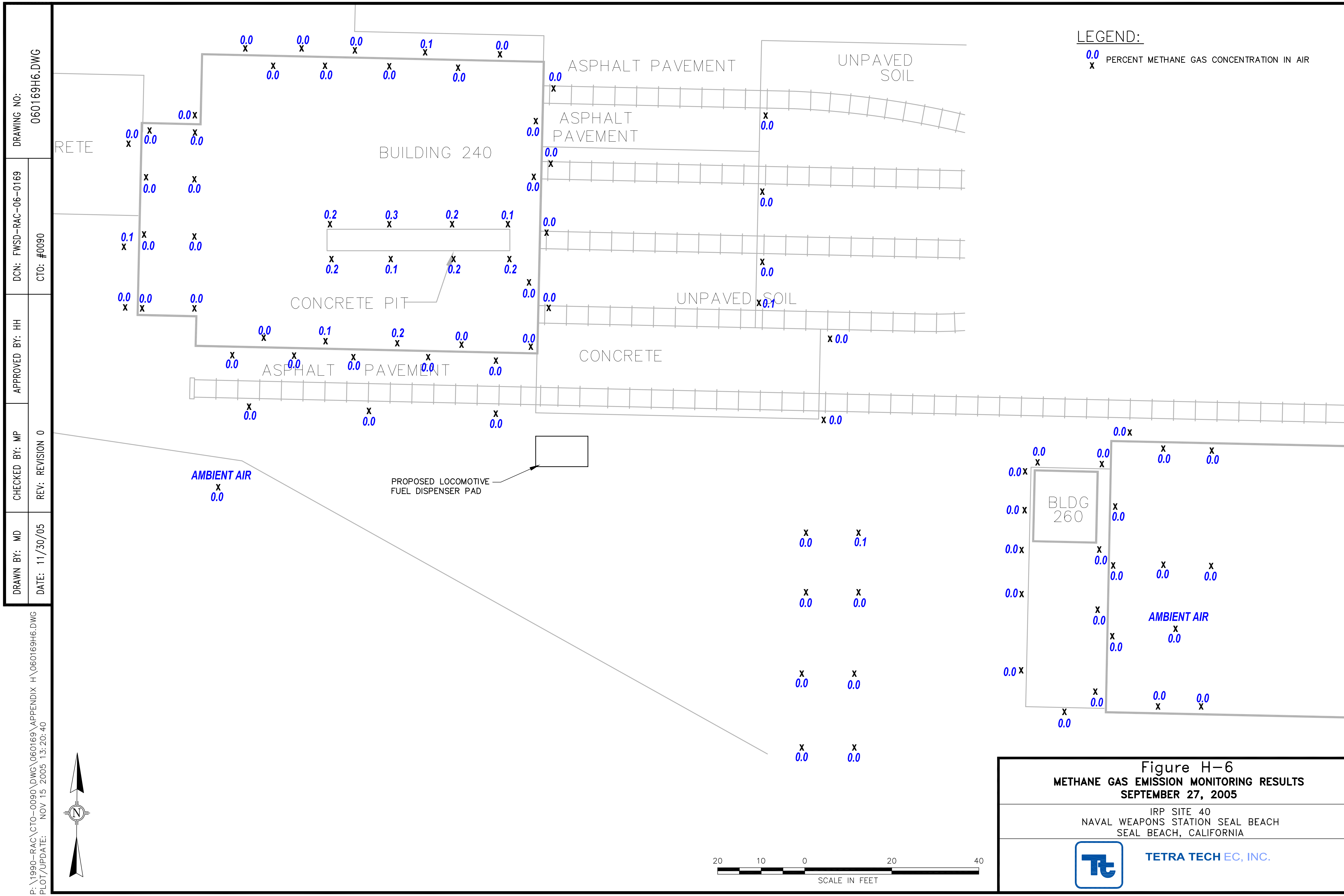

Figure H-6
METHANE GAS EMISSION MONITORING RESULTS
SEPTEMBER 27, 2005

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

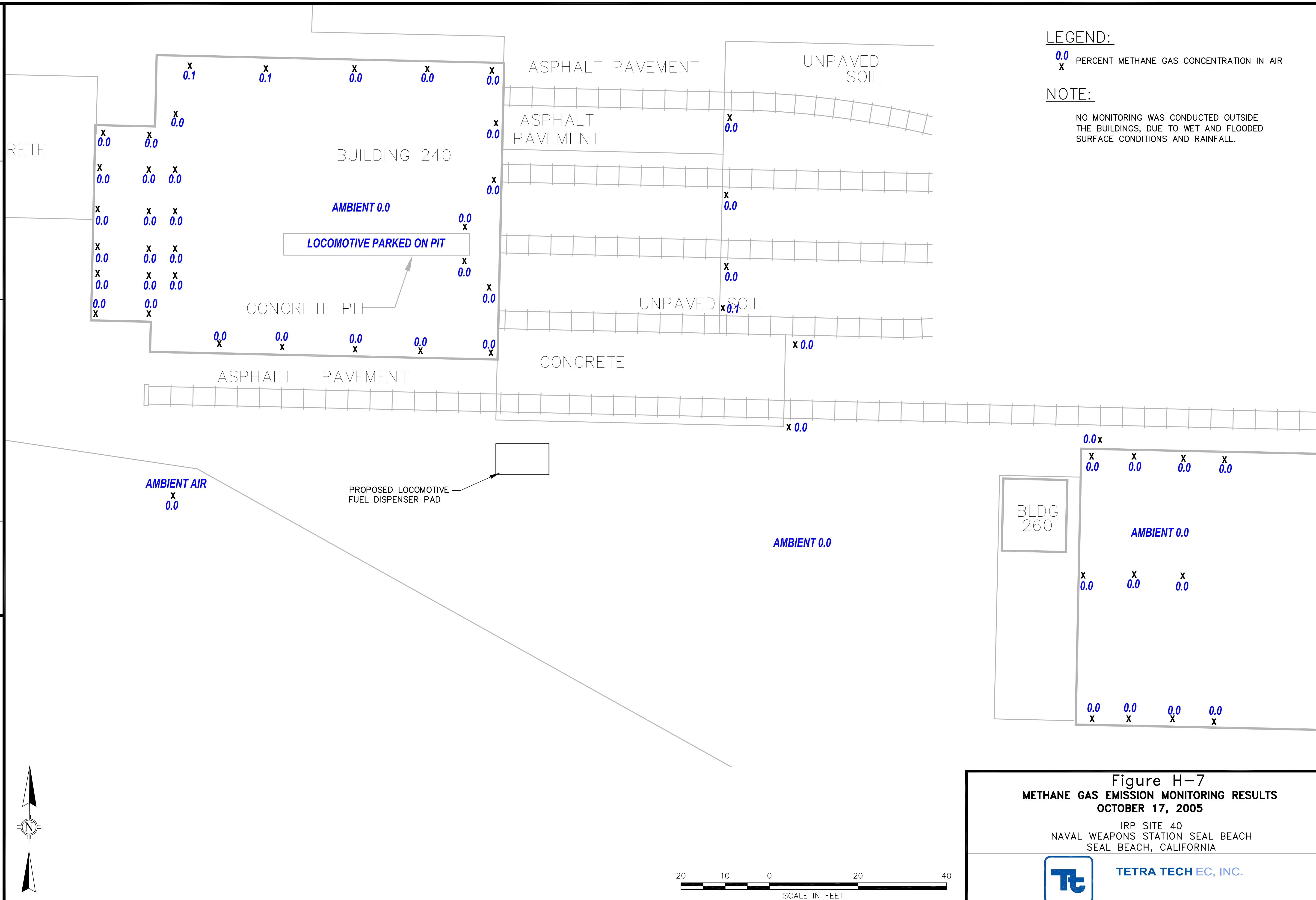

Figure H-7

METHANE GAS EMISSION MONITORING RESULTS
OCTOBER 17, 2005

IRP SITE 40
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

TETRA TECH EC, INC.

DRAWING NO: 060169H7.DWG
DCN: FWSD-RAC-06-0169
CTO: #0090
APPROVED BY: HH
CHECKED BY: MP
REV: REVISION 0
DRAWN BY: MD
DATE: 11/30/05

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